UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF MICHIGAN

HOBART-MAYFIELD, INC.,
d/b/a MAYFIELD ATHLETICS,

Plaintiff,

v.

NATIONAL OPERATING COMMITTEE ON STANDARDS FOR ATHLETIC EQUIPMENT, KRANOS CORP. d/b/a SCHUTT SPORTS, RIDDELL, INC., XENITH, LLC, GREGG HARTLEY, in his capacity as Vice President of the National Operating Committee on Standards for Athletic Equipment, MICHAEL OLIVER, in his Capacity as Executive Director/Legal Counsel of the National Operating Committee on Standards for Athletic Equipment, VINCENT LONG, in his capacity as Engineering Manager of Schutt Sports, and KYLE LAMSON, in his capacity as Director of New Product Innovation of Xenith, LLC,

Defendants.

Case No. 2:19-cv-12712

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Mag. Elizabeth A. Stafford

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FIRST AMENDED COMPLAINT

PLAINTIFF HOBART-MAYFIELD, INC. d/b/a MAYFIELD ATHLETICS, by and through its attorneys, K&L GATES, LLP, hereby submits the following Complaint against the NATIONAL OPERATING COMMITTEE ON STANDARDS FOR ATHLETIC EQUIPMENT; KRANOS CORPORATION d/b/a SCHUTT SPORTS; RIDDELL, INC.; XENITH, LLC; GREGG HARTLEY, in his capacity as Vice President of the National Operating Committee on Standards for Athletic Equipment; MICHAEL OLIVER, in his Capacity as Executive Director/Legal Counsel of the National Operating Committee on Standards for Athletic Equipment; VINCENT LONG, in his capacity as Engineering Manager of Kranos Corporation d/b/a Schutt Sports; and KYLE LAMSON, in his capacity as Director of New Product Innovation of Xenith, LLC.

INTRODUCTION

1. Plaintiff Hobart-Mayfield, Inc. d/b/a Mayfield Athletics ("Mayfield Athletics") has developed an improved football faceguard clip, the S.A.F.E.Clip, which can replace the standard clips on a football helmet facemask and significantly reduce the likelihood a football player will experience a concussion. Mayfield Athletics' S.A.F.E.Clip is one of many different football helmet improvement products collectively referred to as football helmet add-ons ("Add-ons").

2. Defendant National Operating Committee on Standards for Athletic Equipment ("NOCSAE") is a standard-setting organization that has established safety standards for football helmets, but it does not have any standards for Add-ons.

3. NOCSAE has entered into agreements whereby it licenses sports equipment manufacturers the right to market football helmets as certified to satisfy NOCSAE's standards (the "Licensing Agreement"). Virtually all leagues of organized football play ("Organized Play") require the use of NOCSAE certificated football helmets. Defendants Riddell, Inc. ("Riddell"), Kranos Corporation d/b/a Schutt Sports ("Schutt Sports"), and Xenith, LLC ("Xenith") (collectively, "Helmet Manufacturer Defendants") are, but information and belief, the only three companies that sell NOCSAE certified football helmets in the United States.

4. For the past decade, NOCSAE and the Helmet Manufacture Defendants have done everything in their considerable power to discourage, undermine, or outright block the use of Add-ons in Organized Play, regardless of the safety improvements the Add-ons provide to players. Critically, in 2018, NOCSAE granted the Helmet Manufacturer Defendants the unqualified right to void the NOCSAE certification on a football helmet whenever any Add-on is used. This right has been uniformly exercised by each of the Helmet Manufacturer Defendants regardless of whether a helmet continues to satisfy all NOCSAE

standards with the Add-on attached.

5. Mayfield Athletics has demonstrated through authorized testing that the Helmet Manufacturer Defendants' football helmets continue to satisfy all NOCSAE safety standards when the S.A.F.E.Clip is attached. And yet, the vast majority of customers will not buy the S.A.F.E.Clip (or any other Add-ons) because the Defendants maintain that the NOCSAE certifications are void whenever any Add-on is used.

6. As a standard setting body, any decision by NOCSAE to certify or decertify a football helmet is arbitrary and improper if such decisions are not made pursuant to its legitimately adopted standards. NOCSAE is therefore entitled to grant football helmet manufactures the right to void certifications when any helmet / Add-on combination fails to satisfy its helmet standards, or when a helmet / Add-on combination has not been tested to confirm that it has satisfied NOCSAE's standards. However, once authorized testing has verified that any given football helmet / Add-on combination satisfies its standards, NOCSAE has no legitimate standard-setting or other business justification for voiding (or allowing the helmet manufacturer to void) its certification.

7. The NOCSAE Licensing Agreements are anticompetitive agreements that violate Section 1 of the Sherman Act because (i) they explicitly grant the Helmet Manufacturer Defendants the ability to exclude all Add-ons from use in all

Organized Play and thus from the marketplace entirely, regardless of whether football helmets satisfy NOCSAE's standards with the Add-ons attached, and (ii) NOCSAE could accomplish all of its legitimate standard setting objectives without using licensing agreements that have this anticompetitive effect.

8. While the NOCSAE Licensing Agreements on their own are each unlawful agreements in restraint of trade, they are also evidence of a broader agreement between and among NOCSAE and the Helmet Manufacturer Defendants to effectively boycott customers attempting to use Mayfield Athletics' S.A.F.E.Clip or other Add-ons. Specifically, by voiding the NOCSAE certification whenever an Add-on is used, the Helmet Manufacture Defendants are effectively refusing to sell "certified" helmets to customers that attempt to use the Add-ons. This agreement among firms with market power to boycott customers in order to discourage them from doing business with a competitor is *per se* unlawful under Section 1 of the Sherman Act because it is one of the classes of restraints which, from their nature or character, are unduly restrictive. Such an agreement is always forbidden under the antitrust laws of the United States and Michigan, regardless of their actual affect in the markets involved.

9. The evidence that NOCSAE and the Helmet Manufacture Defendants have engaged in a concerted effort to boycott customers that attempt to use Add-ons is overwhelming:

- The Helmet Manufacture Defendants have been voting members and/or have controlled voting members of NOCSAE's Board of Directors;
- NOCSAE initially imposed discriminatory and burdensome testing obligations on Add-on manufactures that were not placed on helmet manufactures;
- Once Add-on manufactures started to obtain test results demonstrating that helmet / Add-on combinations satisfied NOCSAE standards, NOCSAE changed its policies to grant the Helmet Manufacture Defendants the right to void their helmet certifications—even when the helmet / Add-on combinations satisfied all NOCSAE standards;
- NOCSAE, on behalf of Helmet Manufacturer Defendants, actively discourages customers from buying Add-ons regardless of their proven benefits and regardless of whether they satisfied NOCSAE standards; and
- The Helmet Manufacturer Defendants collectively voided helmet certifications in cases where helmet / Add-on combinations continued to satisfy all applicable NOCSAE standards and in cases where it was against their economic interest to so.

10. The Licensing Agreements between NOCSAE and the Helmet Manufacturer Defendants and the agreement to boycott customers that purchase

Add-ons have had substantial, adverse competitive effects in the market for NOCSAE-certified football helmets, football helmet faceguards, helmet replacement parts, and Add-ons.

11. The exclusion of Add-ons and their corresponding safety and quality improvements have allowed Helmet Manufacturer Defendants to avoid competitive pressure to incorporate similar features in their football helmets, faceguards, and replacement parts. The exclusion of Add-ons have also avoided pressure to lower the price of the Helmet Manufacture Defendants' products that lack these features. As a result, customers have been denied the benefits of competition from Add-ons, including lower prices and improved quality for football helmets, faceguards, replacement parts and Add-ons.

THE PARTIES

12. Plaintiff Hobart-Mayfield, Inc., d/b/a Mayfield Athletics is incorporated and headquartered in Michigan.

13. Defendant NOCSAE, a self-appointed nonprofit corporation that develops standards for athletic equipment, is incorporated in Missouri, with its principal place of business in Overland Park, Kansas.

14. Upon information and belief, at all times herein mentioned Defendants Gregg Hartley and Michael Oliver were agents of NOCSAE and, in doing the

things alleged in this complaint, were acting in the scope of such agency and with the permission and consent of NOCSAE.

15. Upon information and belief, currently unnamed Defendants DOE 1 through DOE 25 were agents of NOCSAE at all times herein mentioned and, in doing the things alleged in this Complaint, were acting in the scope of such agency and with the permission and consent of NOCSAE.

16. Defendant Kranos Corporation d/b/a Schutt Sports, a corporation that manufactures football helmets (among other things), is incorporated in Delaware, with its principal place of business in Illinois.

17. Upon information and belief, Defendant Vincent Long was an agent of Schutt Sports and, in doing the things alleged in this Complaint, was acting in the scope of such agency and with the permission and consent of Schutt Sports.

18. Upon information and belief, currently unnamed Defendants DOE 26 through DOE 50 were agents of Schutt Sports at all times herein mentioned and, in doing the things alleged in this Complaint, were acting in the scope of such agency and with the permission and consent of Schutt Sports.

19. Defendant Riddell, Inc., a corporation that manufactures football helmets (among other things), is incorporated and headquartered in Illinois.

20. Upon information and belief, at all times herein mentioned currently

unnamed Defendants DOE 51 through DOE 75 were agents of Riddell and, in doing the things alleged in this Complaint, were acting in the scope of such agency and with the permission and consent of Riddell.

21. Defendant Xenith, LLC, a limited liability company that manufactures football helmets (among other things), is registered in Delaware and headquartered in Michigan.

22. Upon information and belief, Defendant Kyle Lamson was an agent of Xenith at all times herein mentioned and, in doing the things alleged in this Complaint, was acting in the scope of such agency and with the permission and consent of Xenith.

23. Defendants Riddell, Schutt Sports, Xenith, Long, Lamson, and associated Does are collectively identified as the "Helmet Manufacturer Defendants."

JURISDICTION AND VENUE

24. This Court has original subject matter jurisdiction pursuant to 28 U.S.C. § 1331 and 28 U.S.C. § 1337 because Mayfield Athletics' claims arise, in part, under the Sherman Antitrust Act ("Sherman Act"), 15 U.S.C. § 1 *et seq*.

25. This Court also has original subject matter jurisdiction pursuant to 15 U.S.C. §§ 4, 15, and 25, and 28 U.S.C. §§ 1331 and 1337(a) because this Complaint

is brought, in part, under the Clayton Antitrust Act to prevent and restrain Defendants' violations of the federal antitrust laws.

26. This Court has supplemental subject matter jurisdiction over the subject matter of the claims brought under the laws of the State of Michigan pursuant to 28 U.S.C. § 1367 because those claims are so closely related to Mayfield Athletics' federal antitrust claims that they constitute part of the same case or controversy under Article III of the United States Constitution.

27. This Court has personal jurisdiction over all of the defendants named in this complaint by operation of the federal antitrust laws and general federal law governing personal jurisdiction.

28. Venue is proper in this Court under 15 U.S.C. § 22 and 28 U.S.C. § 1391(b)(2) because, inter alia, a substantial part of the events, acts, or omissions giving rise to the claims alleged in this complaint occurred within, or were directed at, this judicial district

TRADE AND COMMERCE

29. Defendants are substantially engaged in interstate commerce and in activities substantially affecting interstate commerce.

30. NOCSAE, through its agents, employees, and/or representatives, develop and implement testing standards for athletic equipment – including, among

other products, football helmets and football helmet faceguards (also referred to as "facemasks") – that apply nationwide. NOCSAE also executes, administers, and controls licensing agreements for its NOCSAE label throughout the United States, the presence of which (or lack thereof) on football helmets and football helmet Add-ons affects the sales and marketability of every football helmet and football helmet Add-on marketed throughout the United Sates.

31. The Helmet Manufacturer Defendants, through their agents, employees, and/or representatives, manufacture and market athletic equipment and, in relevant part, football helmets, throughout the United States. Upon information and belief, the Helmet Manufacturer Defendants' football helmets are sold in every State of the United States.

32. The conspiratorial actions challenged here have substantially reduced and will continue to substantially reduce purchases of football helmet Add-ons made in interstate commerce. These actions have substantially reduced and will continue to substantially reduce the quality of football helmets throughout the United States and the output of football helmet Add-ons, as well as other improvements to football safety equipment, throughout the United States, as explained more fully below.

FACTUAL ALLEGATIONS

NOCSAE Standards for Helmets

33. NOCSAE holds itself out as an independent, nonprofit body that "develops voluntary performance and test standards for athletic equipment that are available for adoption by any athletic regulatory body." (Exhibit A.)

34. NOCSAE purports that its standards are created, revised, and approved by the NOCSAE Standards Committee, which serves as a "consensus body in accordance with the American National Standards Institute ("ANSI") due process requirements for standards development bodies." (Exhibit B.)

35. One of the testing standards which NOCSAE established is the "Severity Index" (or "SI") for evaluating football helmets.

36. NOCSAE's use and promotion of the Severity Index presents it as a reliable standard for the manufacture and use of football helmets. Helmets that pass the minimum requirements under the Severity Index are eligible for NOCSAE certification. ("Standard Test Method and Equipment Used in Evaluating Performance Characteristics of Headgear/Equipment," Exhibit C.)

37. In addition, NOCSAE promulgated Standard ND087 17m17c, which describes the test and performance requirements that football faceguards must meet to qualify for NOCSAE certification. ("Standard Method of Impact Test and Performance Requirements for Football Faceguards," Exhibit D.)

38. The Safety Equipment Institute ("SEI") manages certification of athletic equipment to NOCSAE standards. It is a private, non-profit organization

that administers a non-governmental, third-party certification program, and is a subsidiary of ASTM International. SEI oversees the NOCSAE standards certification process through several authorized, accredited, independent laboratories that are responsible for testing to determine if products meet NOCSAE standards.

39. By information and belief, NOCSAE testing is developed primarily by P. David Halstead. Halstead is the co-founder and director of the Southern Impact Research Center ("SIRC"), which is under contract with NOCSAE and is "responsible for technical issues regarding standards development and implementation including test equipment." (Exhibit E.) NOCSAE further holds Halstead out as its "Technical Director" on its website. (Exhibit F.) In addition, Halstead often appears at trade shows and other events as a representative of NOCSAE.

40. NOCSAE is primarily funded through revenue generated from sport equipment manufacturers (including from Helmet Manufacturer Defendants) for product certification and licensure, including for the use of trademarked NOCSAE and SEI logos and phrases on products that NOCSAE certifies (the Licensing Agreement).

41. NOCSAE enters into Licensing Agreements with the manufacturers of sports equipment, which incorporate a "License Fee Schedule" under which

equipment manufacturers are charged, and NOCSAE receives, a fee for each unit of product sold that includes the trademarked NOCSAE logo(s) or phrase(s) on (1) the product itself, (2) its packaging, (3) its instructions, (4) its product documentation, or (5) its marketing materials.

42. Under this arrangement, NOCSAE's financial viability depends on its continued positive relationship with sport equipment manufacturers, including Helmet Manufacturer Defendants.

43. NOCSAE has promulgated standards for football helmets, football helmet facemasks, and football gloves, but no standard for testing the safety and efficacy of football helmet Add-ons.

44. Upon information and belief, each Helmet Manufacturer Defendant has entered into a Licensing Agreement with NOCSAE under which each Helmet Manufacturer Defendant pays NOCSAE a licensing fee in exchange for authorization to affix a NOCSAE and SEI certification logo indicating that helmets satisfy all NOCSAE standards, which appears as follows:

Helmet Manufacturer Defendants Control NOCSAE

45. In addition to entering into Licensing Agreements that fund NOCSAE, Helmet Manufacturer Defendants exert influence and control over NOCSAE through its Board of Directors.

46. Employees of the Helmet Manufacturer Defendants have served as voting members of NOCSAE's Board or they are in a position to control, direct and influence the athletic organizations that have representation on NOCSAE's board. For example, Gregg Hartley, the current NOCSAE Vice President, also serves on NOCSAE's Board of Directors as a representative of Sports & Fitness Industry Association ("SFIA"). In turn, SFIA's Chairman is Dan Arment, the CEO and President of Riddell. Shaun Gilday of SFIA also serves on NOCSAE's Board of Directors. Similarly, Larry Maddux, the Director of R&D at Schutt Sports and the former President of the National Athletic Equipment Reconditioners Association ("NAERA"), has served on NOCSAE's Board of Directors as a representative of

NAERA. At some point in the past, Don Gleisner of Riddell was a Member at Large of NOCSAE's Board of Directors.

47. On information and belief, multiple other employees of the Helmet Manufacturer Defendants either have served directly on the NOCSAE Board of Directors, or have been members of organizations that are represented on the NOCSAE Board of Directors and in a position to directly influence NOCSAE's conduct and policies.

Leagues at Every Level of Organized Play Require NOCSAE Certification

48. The NFL, NCAA, National Federation of State High School Associations, International Federation of American Football, USA Football, and US Department of Defense Education Activity require that all players use NOCSAE certified football helmets:

a. Upon information and belief, the National Federation of High School Football Rules Book requires that all players wear "[a] helmet and face mask which met the NOCSAE standard at the time of manufacture." The Rules Book further provides: "All players shall wear helmets that carry a warning label regarding the risk of injury and a manufacturer's or reconditioner's certification indicating satisfaction of NOCSAE standards. All such reconditioned helmets shall show recertification to indicate satisfaction with the NOCSAE

standard."

b. Upon information and belief, the Football Rules Book promulgated by the National Collegiate Athletic Association ("NCAA") requires all players to use football helmets that meet NOCSAE standards.

c. Upon information and belief, the National Football League ("NFL") requires players in the league to wear football helmets that meet NOCSAE standards.

d. Upon information and belief, USA Football requires all players to wear helmets that meet NOCSAE standards.

e. Upon information and belief, the International Federation of American Football requires all players to wear helmets that meet NOCSAE standards.

f. Upon information and belief, youth football leagues frequently incorporate by reference the National Federation of High School Football Rules Book and thereby require that all football helmets used by players bear the requisite certification that the helmets satisfy NOCSAE standards.

g. Upon information and belief, many youth football leagues otherwise require that all football helmets used by players bear

the requisite certification of satisfying NOCSAE standards

49. These various leagues constitute the vast majority of Organized Play in the United States, as distinguished from unorganized play that is not governed by any league or body.

50. Other entities—such as the United States Center for Disease Control and Prevention—expressly recommend that the public rely on NOCSAE standards and a manufacturer's certification that its product meets NOCSAE standards in selecting and purchasing a football helmet.

51. NOCSAE's standards and representations by its agents, employees, and representatives provide it with significant influence over purchasers of football helmets and football helmet Add-ons.

52. Football helmets that do not meet NOCSAE standards, and football helmet Add-ons for which NOCSAE does not create standards, are almost entirely excluded from the respective markets for football helmets and football helmet Add-ons.

Football Helmet Reconditioning

53. Football leagues across the various levels of play require that helmets be reconditioned after a set period of time in order to ensure their continued efficacy. Helmet reconditioning is also needed to maintain the NOCSAE certification and the Helmet Manufacturer's warranties.

54. During the normal wear and tear of football play, helmets can break down. Interior pads, airliners, and overall structure of the helmet can be damaged.

55. Reconditioning is a process by which football helmets are inspected, damages parts are removed, and the helmet is re-certified as offering the same level of protection as a new football helmet.

56. According to NOCSAE, since January 2017 standard ND001 has "required that the helmet manufacturer specify a recertification frequency in order to maintain the validity of the original new helmet certification." (Exhibit G.) Helmets not recertified during the period established by the manufacturer "shall no longer be certified." (*Id.*)

57. In addition, "manufacturers may choose to prohibit the recertification of a helmet model" outright, in which case NOCSAE will not allow the helmet to obtain NOCSAE recertification.

58. Football helmets generally remain usable for up to 10 years, but the various governing bodies of Organized Play often require them to be reconditioned every two years to continue to meet NOCSAE certification.

59. Owners of football helmets can purchase reconditioning services from Helmet Manufacturers Defendants. They can also purchase reconditioning services from independent reconditioners, but the Helmet Manufacturer Defendants require that independent reconditioners be authorized by them and use authorized parts.

60. Helmet Manufacturer Defendants authorize only a limited number of parts as compliant, and attempt to steer reconditioners to use the Helmet Manufacturer Defendants' own OEM parts over after-market reconditioning parts.

Mayfield Athletics Develops and Markets the S.A.F.E.Clip

61. Mayfield Athletics formed in 2014 to conceptualize, design, and market a unique football helmet shock absorber, later named the S.A.F.E.Clip.

62. The S.A.F.E.Clip is faceguard clip installed on football helmets to attach the faceguard to the helmet. It can be retrofitted to most existing helmets and faceguards.

63. Unlike typical faceguard clips—which are static and do not absorb force—the S.A.F.E.Clip contains a Sorbothane insert, which causes the S.A.F.E.Clip to absorb and reduce the impact forces to the head each time a football player is hit.

64. The S.A.F.E.Clip received fully patented status in 2017 (P#9750298B2).

65. Mayfield Athletics has a second patent application related to the S.A.F.E.Clip that is currently pending.

66. Between 2016 and 2018, several generations of the S.A.F.E.Clip were extensively tested and refined.

67. Each round of testing was performed at ICS Laboratories, an independent third-party laboratory adhering to NOCSAE standards for new football

helmets. The following helmet models were tested using S.A.F.E.Clips on the following dates, confirming that these helmet models satisfied NOCSAE's standards when used in conjunction with the S.A.F.E.Clip :

- Schutt Youth Recruit Hybrid (Nov. 8, 2017);
- Schutt Youth Recruit Hybrid (Jan. 15, 2018);
- Schutt Youth Vengeance Pro (Mar. 2, 2018);
- Xenith X2E (Mar. 26, 2018);
- Riddell Speed (Mar. 26, 2018);
- Schutt Vengeance Pro (Mar. 26, 2018);
- Riddell Speedflex Varsity (Dec. 5, 2018);
- Riddell Speedflex Varsity (Mar. 11, 2019);
- Riddell Speed (Mar. 11, 2019);
- Schutt Vengeance Pro (Mar. 11, 2019); and
- Xenith Epic+ (Mar. 11, 2019).

68. The most recent testing revealed that use of the S.A.F.E.Clip resulted in force reductions as high as 35% per hit.

69. Additional evidence gathered by players and teams that have tried the S.A.F.E.Clip indicate that the product dramatically reduces the likelihood that players will suffer concussions.

70. Mayfield Athletics has attempted to widely market, distribute, and sell the S.A.F.E.Clip to individual consumers, sports teams, and retailers, among others.

71. Mayfield Athletics also has attempted to establish business relationships with Helmet Manufacturer Defendants, with the hope that the nation's leading helmet manufacturers will (1) utilize the S.A.F.E.Clip as their preferred faceguard clip, (2) offer the S.A.F.E.Clip as an Add-on product for purchase, and/or (3) permit the use of the S.A.F.E.Clip as an approved product for reconditioning, thereby increasing the efficacy and utility of the football helmets sold and used throughout the United States.

Other Football Helmet Add-ons

72. The S.A.F.E.Clip is one of many products that are now commonly referred to as football helmet Add-ons. Other than Mayfield, many additional companies have developed Add-ons that reduce the risk of head injury and concussions for players.

73. Zuti Facemasks, LLC ("Zuti") formed in late 2014 to develop, manufacture, and market faceguards for football helmets. Zuti produces faceguards in a manner unique from other manufacturers. Whereas most faceguards consist of individual pieces of metal welded together, Zuti creates a ceramic mold and fills it with quarter inch molten steel. This results in a mask with no weld points.

74. The production method allows for unfettered design capabilities, including the ability to incorporate any logo or design a player wants. The production method also allows for manufacturer of safer faceguards. Because the masks are constructed as a single piece of steel, rather than welded together, Zuti can control the ductility and chemistry of the metal better than other manufacturers producing standard facemasks. Testing supports this, as NOCSAE-approved testing shows that Zuti faceguards outperform other faceguards in preventing the harmful effects of sudden impacts.

75. Zuti faceguards have been tested at ICS Laboratories exclusively for the Riddell Speedflex helmet. The Zuti faceguards were most recently tested on August 9, 2018. Three faceguard models have been certified by ICS Laboratories as meeting NOCSAE standards when used with the Riddell Speedflex: the BrickhouZe, Crusader, and Shield.

76. Shockstrip, Inc. was formed in 2011 and produces the Shockstrip. The Shockstrip is a patented device consisting of an exterior helmet pad designed to give helmets an added layer of protection and reduce forces associated with helmet-to-helmet impacts. Shockstrips are affixed to the helmet with impact absorbent adhesive (included with strips). The adhesive withstands extreme temperatures (hot or cold) and extreme impact.

77. Shockstrip purports that Shockstrips have been field and independently tested to examine the severity of impact of blows to the head during helmet-to-helmet contact on helmets with Shockstrips and regular helmets without Shockstrips. In all tests, football helmets with Shockstrips performed significantly better than helmets without Shockstrips.

78. By information and belief, independent authorized testing has confirmed that many Helmet Manufacturer Defendant football helmet models continue to satisfy NOCSAE helmet standards when used in conjunction with Shockstrips.

79. Wegener Safety Latch began producing the Wegener Safety Latch in or around 2013. The Wegener Safety Latch is an Add-on product that a player can attach to a helmet's existing chin strap. It virtually eliminates the possibility of a helmet loss.

80. If a player loses his helmet during a tackle play, there is a significantly higher risk of head injury from a helmeted player. Thus, the Wegener Safety Latch reduces the risk of unnecessary head injury to players.

81. By information and belief, independent authorized testing has confirmed that many Helmet Manufacturer Defendant football helmet models continue to satisfy NOCSAE helmet standards when used in conjunction with the

Wegener Safety Latch.

82. Guardian Sports was founded in 2011 and manufacturers the Guardian Cap, which it purports is the leading soft shell helmet cover engineered for impact reduction. It brings a padded, soft-shell layer to the outside of the helmet and reduces impact up to 33%. (Exhibit H.)

83. By information and belief, independent authorized testing has confirmed that many Helmet Manufacturer Defendant football helmet models continue to satisfy NOCSAE helmet standards when used in conjunction with the Guardian Cap.

NOCSAE Policy Statements on Football Helmet Add-ons

84. NOCSAE has not established any standards for football helmet Add-ons except for faceguards. NOCSAE has, however, issued numerous policy statements over time discussing how it and the Helmet Manufacturers will treat the use of a football helmet Add-on (including a faceguard) with respect to a football helmet's NOCSAE certification.[1]

85. Initially, NOCSAE adopted the position that affixing an Add-on to any certified football helmet changed the helmet from the test model and thus voided the NOCSAE certification.

[1] While NOCSAE has a separate standard for faceguards, third-party faceguards that are not manufactured by a helmet's manufacturer are still treated as an "Add-on" by NOCSAE and the Helmet Manufacturer Defendants.

86. For example, on July 16, 2013, NOCSAE issued a press release titled "NOCSAE statement on third party helmet add-on products and certification." (Exhibit I.) Among other things, the press release definitively stated that the addition of after- market products to a helmet "voids the certification of compliance with the NOCSAE standard":

> There are many new products on the market that are intended to be added to helmets, in particular football helmets, which products claim to reduce concussions and make helmets safer and more protective. Whether these are additional liners or padding on the inside, or bumpers, pads, coverings or electronic devices that attach to the outside of the helmet, these products were not included in the certification testing and quality control programs that are required for all helmets that are certified to the NOCSAE standards. To address this situation, and to protect the integrity of the NOCSAE standards, the NOCSAE board of directors has adopted the following position:
>
> > "NOCSAE helmet standards are specific to models which are identical in all aspects, except as to size. The testing required to support the certification is also specific to the model being certified. NOCSAE standards require that any change in configuration, padding, shell geometry, or protective system requires a new model designation with separate certification testing. The addition of after- market items by anyone that changes or alters the protective system by adding or deleting protective padding to the inside or outside of the helmet, or which changes or alters the geometry of the shell or adds mass to the helmet, whether temporary or permanent, **voids the certification of compliance with the NOCSAE standard.**" (Emphasis added.)

87. At the time of the July 16, 2013 press release, however, NOCSAE told Add-on manufacturers (including Mayfield Athletics) that they could test helmet

model and Add-on combinations, and that, if such combinations continued to meet NOCSAE standards, then Add-on manufacturers could display NOCSAE certification for the specific helmet model / Add-on combination.

88. Indeed, approximately three weeks after the 2013 press release, NOCSAE issued another press release titled "Certification to NOCSAE Standards and Add-on Helmet Products" (Exhibit J), which clarified this position. The press release stated, in relevant part:

- NOCSAE itself does not certify any product, it does not "approve" or "disapprove" of any product, and has no authority to grant exemptions or waivers to the requirements imposed by the standards it writes.
- The addition of an item(s) to a helmet previously certified without those item(s) creates a new untested model. Whether the add-on product changes the performance or not, the helmet model with the add-on product is no longer "identical in every respect" to the one originally certified by the manufacturer.
- When this happens, the manufacturer which made the original certification has the right, under the NOCSAE standards, to declare its certification void. It also can decide to engage in additional certification testing of the new model and certify the new model with the add-on product, but it is not required to do so.
- **Companies which make add-on products for football helmets have the right to make their own certification of compliance with the NOCSAE standards on a helmet model, but when that is done, the certification and responsibility for the helmet/third-party product combination would become theirs, (not the helmet manufacturer).** That certification would be subject to the same obligations applicable to the original helmet manufacturer regarding certification testing, quality control and quality assurance and licensure with NOCSAE.

- Products such as skull caps, headbands, mouth guards, ear inserts or other items that are not attached or incorporated in some way into the helmet are not the types of products that create a new model as defined in the NOCSAE standards and are not items which change the model definition. (Emphasis added.)

89. In reliance on this policy, and specifically the right to obtain its own certification outside of the control of the Helmet Manufacturer Defendants, Mayfield Athletics and other Add-on manufacturers invested in developing Add-on and testing them with helmets in order to establish that the helmet / Add-on combination met NOCSAE certification. This was done with the intent of marketing the Add-on as compatible with specific, popular helmet models, under NOCSAE standards and thus eligible for use under relevant Organized Play rules.

90. On May 8, 2018—after Mayfield Athletics had subjected the S.A.F.E.Clip to extensive testing and began to market the S.A.F.E.Clip to customers—NOCSAE dramatically changed its Add-on policy. Specifically, NOCSAE published a press release titled "Certification to NOCSAE Standards and Add-on Helmet Products." (Exhibit K.) It stated:

- NOCSAE, itself, does not certify any product, it does not "approve" or "disapprove" of any product, and has no authority to grant exemptions or waivers to the requirements imposed by the standards it writes.

- The addition of an item(s) to a helmet previously certified without the item(s) creates a new untested model. Whether the add-on product improves the performance or not, the helmet model with the add-on product is no longer "identical in every aspect" to the

one originally certified by the manufacturer.

- **When this happens, the helmet manufacturer has the right, under the NOCSAE standards, to declare its certification void.** It may elect to allow the certification to remain unaffected, or it may also decide to engage in additional certification testing of the new model and certify the new model with the add-on product, but it is not required to do so.

  - Products such as skull caps, headbands, mouth guards, ear inserts or other items that are not attached or incorporated in some way into the helmet are not the types of products that create a new model as defined in the NOCSAE standards, and are not items which change the model definition. (Emphasis added.)

91. Critically, the May 8, 2018 press release ***eliminated*** the right of Add-on manufacturers to obtain their own certification for helmet model / Add-on combinations.

92. The Helmet Manufacturer Defendants have collectively said publicly and to Mayfield Athletics that they will void the NOCSAE certification of any helmet using any third-party Add-on. As such, the NOCSAE policy eliminated the ability of Add-on manufacturers to sell any Add-on (including any faceguard) for helmets that require NOCSAE certification. This prohibition on Add-ons competing in the marketplace applies **regardless** of whether the Add-on passes NOCSAE testing requirements or improves on safety of a helmet.

Relevant Market and Competition

93. There is a relevant product market for the sale of NOCSAE-certified football helmets to retailers, teams, and players.

94. NOCSAE-certified football helmets are not interchangeable with football helmets that do not meet NOCSAE certification. Leagues at nearly every level of Organized Play require players to use only NOCSAE-certified football helmets. As such, purchasers of football helmets will not purchase football helmets that lack NOCSAE certification.

95. The relevant geographic market for football helmets is the United States. Football helmets are sold to customers nationwide through retailers, wholesalers, and directly from manufacturers.

96. There is a relevant product market for NOCSAE-certified faceguards that do not void a football helmet's NOCSAE certification.

97. Faceguards without NOCSAE certification are not interchangeable with faceguards that receive NOCSAE certification. Leagues at nearly every level of Organized Play require players to use only NOCSAE-certified faceguards. As such, purchasers of faceguards will not purchase faceguards that lack NOCSAE certification.

98. Faceguards that void a NOCSAE helmet certification are not interchangeable with faceguards that do not void a NOCSAE certification because they cannot be used in most Organized Play.

99. The relevant geographic market for faceguards is the United States.

100. There is a relevant product market for faceguard clips that do not void football helmets' NOCSAE certification. Consumers purchase faceguard clips to replace OEM faceguard clips and as part of purchasing helmet reconditioning services.

101. Faceguard clips that void NOCSAE certification are not interchangeable with faceguard clips that do not void NOCSAE certification. Leagues at nearly every level of Organized Play require players to use only NOCSAE-certified helmets. As such, purchasers of faceguard clips will not purchase faceguard clips that would void their helmets' NOCSAE certification.

102. The relevant geographic market for faceguard clips is the United States.

103. There is a relevant product market for the sale of reconditioning parts that do not void a football helmet's NOCSAE certification. Reconditioning parts are component parts of a football helmet that can be replaced during the reconditioning process. Presently, for reconditioning parts not to void a football helmet's NOCSAE certification, the parts must be authorized by the helmet manufacturers.

104. Helmet reconditioning parts that are not authorized by the football helmet manufacturers or that would otherwise void a football helmet's NOCSAE certification when used are not interchangeable with reconditioning parts that would

maintain the NOCSAE certification. Leagues at nearly every level of Organized Play require players to use only NOCSAE-certified helmets. As such, purchasers of reconditioning parts will not purchase reconditioning parts that would void their helmets' NOCSAE certification

105. There are multiple additional relevant markets for football helmet Add-ons that do not void a football helmets NOCSAE certification. Add-ons refer to the various types of parts that can replace OEM parts on a football helmet or that can be affixed to football helmets in addition to OEM parts. Faceguards, such as the Zuti faceguard models, and faceguard clips, such as the S.A.F.E.Clip, fall under the broader category of Add-ons. Markets for Add-ons also include, among others, markets for outer bumpers (e.g., the Shockstrip), chin straps (e.g., the Wegener Safety Latch), and outer protectors (e.g., the Guardian Cap).

106. Add-ons that void NOCSAE certification are not interchangeable with Add-ons that do not void NOCSAE certification. Leagues at nearly every level of Organized Play require players to use only NOCSAE-certified helmets. As such, purchasers of Add-ons will not purchase Add-ons that would void their helmets' NOCSAE certification.

107. The relevant geographic market for football helmet Add-ons is the United States.

108. Some football helmet Add-ons could be substituted for reconditioning parts and would be included in the market for reconditioning parts if their use did not void a football helmets NOCSAE certification. For example, Mayfield's S.A.F.E.Clip could be used to replace football helmet faceguard clips during the reconditioning process.

109. The relevant geographic market for reconditioning parts for football helmets is the United States.

Market Shares

110. The market for football helmets is highly concentrated. There are only three manufacturers of NOCSAE-certified football helmets: Riddell, Schutt Sports, and Xenith.

111. Helmet Manufacturer Defendants control approximately 100% of the football helmet and football helmet replacement-part markets. According to information published in a wide range of news article Riddell and Schutt Sports collectively control approximately 90% of the United States market for football helmets and Xenith controls approximately 10%. (Exhibit L.)

112. The Helmet Manufacturer Defendants each produce or sell faceguards and also control the supply of the entire market for faceguards that do not void NOCSAE certification. That is because the Helmet Manufacturer Defendants act as

gatekeepers, controlling which faceguards consumers may affix to a helmet without voiding the helmet's NOCSAE certification.

113. The Helmet Manufacturer Defendants each produce or sell faceguard clips and also control the supply of the entire market for faceguard clips that do not void NOCSAE certification. That is because the Helmet Manufacturer Defendants act as gatekeepers, controlling which faceguard clips consumers may affix to a helmet without voiding the helmet's NOCSAE certification.

114. The Helmet Manufacturer Defendants each produce or sell reconditioning parts and also control the supply of the entire market for reconditioning parts that do not void NOCSAE certification. That is because the Helmet Manufacturer Defendants act as gatekeepers, controlling which reconditioning parts consumers may affix to a helmet without voiding the helmet's NOCSAE certification.

115. The Helmet Manufacturer Defendants supply or control the supply of all various markets that constitute Add-ons that do not void NOCSAE certification. That is because the Helmet Manufacturer Defendants produce or sell products that compete with various Add-ons and act as gatekeepers for which Add-ons consumers may affix to a helmet without voiding the helmet's NOCSAE certification.

NOCSAE's Licensing Agreements Are Each Unreasonable Restraints of Trade

116. The Licensing Agreements between NOCSAE and each Helmet

Manufacturer Defendant are agreements that unreasonably restrain trade in violation of Section 1 of the Sherman Act.

117. NOCSAE has entered into individual Licensing Agreements with each Helmet Manufacturer Defendant. Under these agreements, each Helmet Manufacturer Defendant that produces a helmet that meets NOCSAE standards can affix the NOCSAE logo indicating that the helmet is NOCSAE certified.

118. Under the current NOCSAE policy addressing the use of Add-ons, when a football helmet Add-on is affixed to a NOCSAE certified helmet, "[the] helmet manufacturer ***has the right***, under the NOCSAE standards, to declare its certification void." (Emphasis added) (Exhibit K.)

119. The NOCSAE Licensing Agreements thus grant each Helmet Manufacturer Defendant the right to void its NOCSAE certification when an Add-on is affixed to a helmet, ***even in cases where the helmets continue to satisfy all applicable NOCSAE standards with the Add-on attached.***

120. The NOCSAE Licensing Agreements have an anticompetitive effect because they allow the Helmet Manufacturer Defendants, individually and collectively, to exclude Plaintiff's and other third-party Add-on manufacturers' products from use in Organized Play and thus from competing in any of the relevant markets for the following reasons:

- The NOCSAE Licensing Agreements as administered by NOCSAE grant football helmet manufactures the absolute right to void their certifications on any helmet when any Add-on is attached, even if the helmet continues to satisfy all applicable NOCSAE standards when the Add-On is attached.
- Helmet Manufacturer Defendants have stated that they will, in fact, void all helmet certifications when any Add-on is attached.
- Virtually every level of Organized Play require players to use NOCSAE certified football helmets.
- Customers will not purchase football helmet Add-ons if they believe they will not be able to use them in Organized Play because the Manufacturer Defendants will void the helmet certifications if they attempt to use them.

121. The three Helmet Manufacturer Defendants collectively control approximately 100% of the market for the sale of new football helmets. Therefore, the NOCSAE Licensing Agreements allow NOCSAE and the three Helmet Manufacturer Defendants to effectively foreclose Plaintiff from access to almost all potential customers by de-certifying (or even threatening to de-certify) their helmets whenever a third-party Add-on is attached to them.

122. The NOCSAE Licensing Agreements, which include NOCSAE's policy allowing the de-certification of helmets that incorporate Add-ons, are unreasonable restrains of trade because their terms are overly broad, anticompetitive, and exclusionary, with no legitimate standard setting or other business justification.

123. As a standard setting body, any decision by NOCSAE to certify or decertify a football helmet is arbitrary and improper if such decisions are not made pursuant to its legitimately adopted standards.

124. NOCSAE has adopted football helmet standards, but it has not adopted football helmet Add-on standards.

125. NOCSAE is therefore entitled to grant football helmet manufactures the right to void certifications when a helmet / Add-on combination fails to satisfy its helmet standards, or when a helmet / Add-on combination has not been tested to confirm that it has satisfied NOCSAE's standards.

126. However, once a NOCSAE-authorized testing laboratory has verified that any given football helmet / Add-on combination satisfies all applicable NOCSAEs standards, NOCSAE has no legitimate standard setting or other business justification for voiding (or allowing the helmet manufacturer to void) its certification.

127. NOCSAE's Licensing Agreements, which grant Helmet Manufacturer

Defendants the unqualified right to void any certification when any Add-on is attached, are unreasonably anticompetitive because all of NOCSAE's legitimate standard setting objectives could be served with less restrictive licensing terms.

128. The NOCSAE Licensing Agreements would satisfy all of NOCSAE's football helmet standard setting objectives by granting helmet manufacturers the right to void helmet certifications in any case where NOCSAE authorized laboratory testing has not yet established that any given helmet model / Add-on combination continues to satisfy all applicable NOCSAE standards. However, there is no competitive, safety or other justification why NOCSAE's agreements should grant helmet manufactures the unqualified right to void the NOCSAE certification whenever any third-party Add-on is used because this allows the Helmet Manufacturer Defendants to void their certifications even when NOCSAE authorized laboratory testing has shown that the helmet / Add-on combination satisfies all applicable NOCSAE standards.

129. NOCSAE's Licensing Agreements, which grant Helmet Manufacturer Defendants the absolute right to void NOCSAE certification on all helmets when used with Add-ons, are unreasonably anticompetitive because they allow the overly broad exclusion of helmets / Add-on combinations that satisfy NOCSAE's helmet standards.

NOCSAE and Helmet Manufacturer Defendants Unlawfully Agreed to Exclude Third-Party Add-ons from Use in Organized Play

130. Although the Licensing Agreements on their own are each unreasonable restraints of trade in violation of the Sherman Act, they are also evidence of a broader agreement between and among NOCSAE and the Helmet Manufacturer Defendants to entirely prohibit the use and sale of third-party football helmet Add-ons for use in Organized Play leagues that mandate football helmets be NOCSAE certified.

131. Extensive evidence of concerted action between NOCSAE and the Helmet Manufacturer Defendants demonstrates the existence of an agreement between them to exclude Add-ons from use in all Organized Play that mandate the use of NOCSAE certified football helmets.

The Helmet Manufacturers Control and Direct NOCSAE Board Decisions Regarding Add-ons

132. Employees of the Helmet Manufacturer Defendants have served as voting members of NOCSAE's Board of Directors or they are in a position to control, direct, and influence the athletic organizations that have representation on NOCSAE's Board. For example, Gregg Hartley, the current NOCSAE Vice President, also serves on NOCSAE's board of directors as representative of Sports & Fitness Industry Association (SFIA), and SFIA's Chairman is Dan Arment, the CEO and President of Riddell. Similarly, Larry Maddux, the Director of R&D at Schutt Sports and the former President of the National Athletic Equipment

Reconditioners Association ("NAERA"), has served on NOCSAE's Board of Directors as a representative of the NAERA. Both Gregg Hartley and Larry Maddox served on NOCSAE's Board during all or most of the 2012-2018 time frame in which the allegation set forth in this complaint took place.

133. On information and belief, multiple other employees of the Helmet Manufacturer Defendants either have served directly on the NOCSAE Board of Directors, or have been member of organization that are represented on the NOCSAE Board and in a position to directly influence NOCSAE's conduct and policy on Add-ons.

NOCSAE Imposed Discriminatory Testing Standards

134. NOCSAE imposed burdensome testing requirements on Add-on manufactures that they did not impose on football helmet manufacturers. Specifically, NOCSAE required Add-on manufactures to submit far more football helmets for testing to establish a NOCSAE certification for a given football helmet model than NOCSAE required Helmet Manufacturer Defendants themselves to provide in order to establish a NOCSAE certification for a given football helmet model.

135. For example, on September 17, 2013, Michael Oliver of NOCSAE wrote to Shockstrip stating that, for each helmet model it wanted certified for use

with the Shockstrip Add-on product, it would need to test a "statistically significant number of new helmets **by size**." Oliver further wrote that Shockstrip would need to test approximately **220 helmets** to confirm compliance with NOCSAE standards for merely one helmet model. (Emphasis added) (Exhibit M.) As another example, in or around March 2017, a Schutt Sports representative told Mayfield Athletics that, under the NOCSAE policy, for each Schutt helmet model for which Mayfield Athletics sought NOCSAE certification, it would need to test six helmets for each **size** of that helmet model. Thus, if one model was sold in small, medium, large, and extra-large sizes, Schutt Sports' interpretation of NOCSAE's policy was that Mayfield Athletics needed to test 24 helmets to obtain certification for that one model.

136. By contrast, SEI authorized testing labs have explained to Mayfield Athletics that Helmet Manufacturer Defendants can submit as few as **six** helmets per helmet model for testing to secure certification. Most critically, **differences in football helmet sizes and other features are considered "variants" that do not require further testing when applied to the Helmet Manufacturer Defendants.**

137. These NOCSAE testing requirements imposed an extraordinary testing burden on Add-on manufacturers that was not imposed on the Helmet Manufacturer Defendants. Under these testing requirements, Add-on manufactures would need to purchase hundreds if not thousands of football helmets from the

Helmet Manufacturer Defendants and submit them for testing to confirm that an Add-on's use complies with the NOCSAE helmet standards for just five or six of the most popular football helmet models.

138. NOCSAE only has one football helmet standard. It does not have different standards for testing helmets, on one hand, and helmet / Add-on combinations on the other hand. Therefore, the only explanation for NOCSAE's requirement that Add-on manufactures submit more helmets for testing than Helmet Manufacturer Defendants is that an agreement exists between NOCSAE and the Helmet Manufactures Defendants to impose burdens on the Add-on manufactures that would discourage them from attempting to enter the market.

NOCSAE Changed Its Certification Policy to Block Add-ons

139. In August, 2013, NOCSAE adopted a policy that allowed Add-on manufactures to take steps to bring their products to market by obtaining their own certification for a helmet / Add-on combination. As the August, 2013 NOCSAE press released stated, "Companies which make add-on products for football helmets have the right to make their own certification of compliance with the NOCSAE standards on a helmet model, but when that is done, the certification and responsibility for the helmet/third-party product combination would become theirs, (not the helmet manufacturer's)." (Exhibit J.)

140. Despite its August, 2013 policy announcement, as discussed in paragraphs 88-89, NOCSAE and the Helmet Manufacturer Defendants attempted to impose excessive testing burdens on Add-on manufacturers that would block these products from entering the market.

141. Despite these efforts, however, by May 2018 Mayfield Athletics and other Add-on manufacturers had begun to obtain positive testing results showing that various helmet / Add-on combinations would meet NOCSAE helmet standards.

142. In response, NOCSAE fundamentally and publicly changed its football helmet certification policy with regard to Add-ons and granted Helmet Manufacturer Defendants new rights under their Licensing Agreements. This was done by a press release issued in May 2018, titled "Certification of NOCSAE Standards and Add-on Helmet Products." (Exhibit K.) While identical to the 2013 press release in many respects, the 2018 press release **removed** the provision allowing Add-on manufacturers to obtain NOCSAE certification for helmet / Add-on combinations.

143. Instead, NOCSAE stated that helmet manufacturers now had the exclusive right to decertify football helmets when paired with an Add-on **regardless** of whether authorized testing had demonstrated that a helmet / Add-on combination satisfied all applicable NOCSAE standards.

144. NOCSAE's decision to change its Add-on policy, and grant the Helmet Manufacturer Defendants the right to void helmet certifications, even in cases where

a helmet / Add-on combination satisfied all NOCSAE helmet standards, is further evidence that NOCSAE and the Helmet Manufacturer Defendants had agreed to use the NOCSAE certification standards to eliminate or exclude competitors from the various markets for Add-ons.

NOCSAE Directed Add-on Manufacturers to Work with Helmet Manufacturer Defendants Rather than Introduce Competing Products

145. As a standard setting body, NOCSAE should be indifferent to whether or not third-party Add-on products are used. They should only be concerned with whether or not football helmets satisfy their technical standards with the Add-on attached. And yet NOCSAE regularly appears to have discouraged Add-on manufacturers from even attempting to reach the market independently and compete with the Helmet Manufacturer Defendants.

146. Zuti contacted David Halstead in his capacity at NOCSAE on or around January 20, 2017. The purpose of the correspondence was to discuss operating as a third-party manufacturer of football helmet faceguards that could be substituted for the faceguards on the Helmet Manufacturer Defendants' football helmets. Halstead discouraged Zuti from attempting to market third-party faceguards that compete with the Helmet Manufacturer Defendants, stating it would be challenging to sell faceguards that are not authorized by the Helmet

Manufacturer Defendants. Instead he suggested that Zuti attempt to work with the Helmet Manufacturer Defendants.

147. Halstead made a similar representation in a November 5, 2019 email to Shockstrip, writing: "[B]efore you spend your money on [testing] you should know that at this time your product cannot pass a NOCSAE standard . . . At this point **the only way to get your product on the field is to have an arrangement with the helmet manufacturers** so your device can be on and tested by them prior to sale and further that the helmet maker will not declare the helmet certification void with your device attached. The default position is, unless you have something in writing from the manufacturer whose helmet the device is on, stating it is OK and they have tested it, it is not legal." (Emphasis added) (Exhibit N.)

148. NOCSAE's efforts to force Add-on manufactures to work with – rather than compete against – Helmet Manufacturer Defendants, is evidence that NOCSAE and the Helmet Manufacturer Defendants agreed to use the NOCSAE certification standards to exclude the Add-ons from the market.

NOCSAE Discouraged Customers from Buying Add-ons

149. As a standard setting body NOCSAE should be indifferent to whether or not consumers purchase third-party Add-on products. They should only be concerned with whether or not football helmets satisfy their technical standards with

the Add-ons attached. And yet NOCSAE regularly appears to have discouraged customers from using Add-ons, regardless of whether or not a football helmet satisfies the NOCSAE standards with the Add-on attached.

150. For example, David Halstead discouraged consumers from purchasing Shockstrips. On November 21, 2019, he responded to an enquiry from the football coach of Waterloo High School in Waterloo, Ohio concerning the Shockstrip. Halstead wrote that adding the Shockstrip "voids the warranty unless you have something in writing from the makers of the helmet stating that it is an authorized add-on. Without that, **and it is unlikely you will get that**, your helmets would be decertified." (Emphasis added)(Exhibit O.)

151. NOCSAE's website hosts statements consistent with Halstead's warnings:

> Helmets should not be altered. Add-on accessories can change a helmet and interfere with performance in ways unintended by the manufacturer. The helmet's original padding, fit and components were tested for compliance with the NOCSAE standards, and altering these components may result in a helmet that does not perform as designed, and could increase the risk of injury. **A manufacturer can declare a product's certification to the NOCSAE standard void if its product is altered.** (Emphasis added (Exhibit A.)

152. Indeed, since its 2018 policy change that eliminated an Add-on manufactures' ability to obtain its own certification, NOCSAE has not only told potential customers for football helmet Add-ons that the Helmet Manufacturer

Defendants **can** void the NOCSAE certification if an Add-on is used, but that the helmet manufacturers **likely would** void the NOCSAE certification if helmet Add-ons were used.

153. NOCSAE has put its proverbial "thumb on the scale" and discouraged customers from purchasing Add-ons. Indeed, to advise potential customers that Helmet Manufacturer Defendants likely would void their NOCSAE helmet certifications if the Add-ons were used (regardless of the safety benefits and testing undertaken by the individual Add-on's manufacturer) is evidence that NOCSAE and the Helmet Manufacturer Defendants have both discussed using and agreed to use the NOCSAE certification standards to exclude the Add-ons from the market.

Helmet Manufacturer Defendants Have All Stated in Parallel that Use of Add-ons Will Void Their Helmets' NOCSAE Certification

154. Helmet Manufacturer Defendants have repeatedly and publicly warned customers—through websites, publications, and direct statements made by individual sales personnel and management members—that use of the S.A.F.E.Clip and other Add-ons with their helmets would void the helmets' NOCSAE certification. These pronouncements have all been in parallel with one another.

155. On August 17, 2018, Riddell issued a "Response to Address Aftermarket Accessories and NOCSAE Certification," stating that the NOCSAE certification "is void if the helmet or face mask is modified in any way. Riddell recommends against the use of any third party aftermarket accessories . . . as such

modifications void the NOCSAE certification and render the helmet or face mask illegal for most organized play." (Exhibit P.)

156. Xenith's helmet warranty is published on its website and states, in relevant part, "This warranty shall be void as a result of . . . use of helmet replacement parts other than Xenith approved replacement parts . . . the application of any unapproved device or material to the helmet . . . [or] failure to use a Xenith authorized helmet reconditioner." (Exhibit Q.)

157. Schutt Sports publishes warranty and NOCSAE certification information on its website. It states, in relevant part, "All Schutt helmets and faceguards are manufactured and certified to meet the current NOCSAE performance standards. Alterations, additions or any component deletions or removals made to the helmet or faceguard that do not follow the manufacturer's guidelines may void any applicable warranty to the product and will void the NOCSAE certification of the helmet and faceguard." (Exhibit R.)

158. The Helmet Manufacturer Defendants have, in fact, voided their NOCSAE helmet certifications in instances where Add-on manufacturers have proven through testing in authorized labs that helmets continue to satisfy all NOCSAE standards when used in conjunction with their Add-ons.

159. For example, agents, employees, and/or representatives of Schutt Sports told dealers at the Sports, Inc., show on June 18, 2019, in Columbus, Ohio, that use of the S.A.F.E.Clip on a Schutt Sports helmet would void its NOCSAE certification. As described in paragraph 67, Mayfield Athletics has established that multiple Schutt helmets continue to pass all NOCSAE certification standards when use in conjunction with its S.A.F.E.Clip.

160. As another example, Zuti has developed faceguards – the BrickhouZe, Crusader, and Shield – all of which have satisfied applicable NOCSAE faceguard standards, and Zuti has demonstrated though authorized testing that Riddell's Speedflex continues to satisfy all applicable NOCSAE standards when used with the Zuti faceguard. At an SIRC meeting on November 11, 2019, Thad Ide, Senior Vice President of Research and Product Development for Riddell, confirmed that Zuti had shown that its Add-on product satisfied all applicable NOCSAE standards for use on its helmets, but that Riddell nevertheless still voids its helmet certifications if the helmets are used with a Zuti faceguard.

161. If any one of the Helmet Manufacturers were to allow the use of Add-ons on its helmets, such Helmet Manufacturer would gain a competitive advantage in the form of having greater options for customers and a safer overall helmet

product. Yet, each and every Helmet Manufacturer has entirely rejected the use of Add-ons *even where the Add-ons pass all NOCSAE standards*.

162. The evidence of concerted action among NOCSAE and the Helmet Manufacturer Defendants demonstrates that NOCSAE and the Helmet Manufacturer Defends agreed and conspired to exclude Add-ons from the market.

NOCSAE's Actions Were Contrary to Its Economic Interests

163. NOCSAE would not have acted in the same manner absent an agreement with the Helmet Manufacturer Defendants because blocking Add-ons is against its own economic interests.

164. NOCSAE's policy against Add-Ons deprived it of revenue. NOCSAE generates revenue from licensing agreements, and expanding the number of manufacturers that seek to obtain licensing agreements would increase NOCSAE's revenue. Indeed, NOCSAE initially adopted a policy in 2012 that allowed Add-on manufacturers to test helmet / Add-on combinations and then assume responsibility for the helmet's NOCSAE certification. This policy would have increased NOCSAE licensing fees by enabling Add-on manufacturers to license the NOCSAE helmet certifications. Nevertheless, NOCSAE reversed this policy in 2018, giving the Helmet Manufacturer Defendants complete control over NOCSAE's certifications,

including the right to void their certifications even when helmet / Add-on combination continued to satisfy all NOCSAE helmet standards.

165. NOCSAE's policy change did not merely deprive it of theoretical revenue. Numerous businesses and individuals have approached NOCSAE seeking certification to sell or permission to use Add-ons. The demand among both Add-on manufacturers and consumers to market and purchase Add-ons would be expected to cause NOCSAE to expand certification protocols for Add-ons. Instead, NOCSAE responded to the rise of Add-ons in response to player concussion concerns by changing its policies to give manufacturers the right to decertify helmets with Add-ons ***regardless*** of whether Add-ons met NOCSAE standards for football helmets and ***regardless*** of whether Add-ons actually increase the safety of football helmets.

166. This policy change clearly contradicted NOCSAE's economic interests as it served to limit its pool of potential licenses, reduced their licensing fees, and undermined the credibility of their helmet standards.

Defendants Engaged in Uniform and Parallel Conduct

167. The Helmet Manufacturers have each stated that use of third-party helmet Add-ons, including the S.A.F.E.Clip, will automatically void their respective helmets' NOCSAE certification. In doing so, each adopted similar or parallel language, terms, and conditions concerning the voiding of NOCSAE certification

for use of an Add-on. Where the use of Add-ons result in helmet models that continue to satisfy all NOCSAE technical standards, there is no legitimate justification for such parallel conduct other than to exclude Add-ons from the market.

Defendants Had Opportunities to Exchange Information

168. Upon information and belief, employees, representatives, and/or agents of Helmet Manufacturer Defendants have exchanged communications concerning the S.A.F.E.Clip and other Add-ons in furtherance of their conspiracy.

169. Helmet Manufacturer Defendants have had ample opportunity to collude and signal to one another directly – and through NOCSAE and trade organizations – the continued policy to void NOCSAE certification for helmet Add-ons. They have done this through attendance at NOCSAE meetings and trade shows; emails with one another; and other methods of communication.

170. In furtherance of the agreement among the Helmet Manufacturers to exclude Add-ons, the Helmet Manufacturers exchanged information specifically about the S.A.F.E.Clip in order to ensure that each manufacturer continued to abide by the conspiracy to void NOCSAE certification and ensure that they were aligned in their justifications for refusing to maintain NOCSAE certification if their helmets were paired with a S.A.F.E.Clip.

171. For example, Mayfield Athletics previously discussed testing of the S.A.F.E.Clip with Schutt Sports. In an email dated February 8, 2018, Vincent Long, Engineering Manager of Schutt Sports, claimed that Mayfield Athletics' "original clip" "result[ed] in facial contact of the guard to the chin which as you know is considered a failure." This "original clip" was different from the second generation S.A.F.E.Clip, which Mayfield Athletics marketed in 2018 and which never failed any independent testing. Long went on to write, "In speaking with an engineer from another football helmet manufacturer he reported they saw the same thing and this was with product that they had just recently bought off your internet site." (Exhibit S.)

172. Based on the company's disclosure agreements and online purchasing history, Mayfield Athletics was able to determine that "the engineer from another football helmet manufacturer" referenced in Long's email was an engineer from Xenith.

173. Communications between Xenith and Schutt Sports concerning testing of the S.A.F.E.Clip violated the nondisclosure agreement between Mayfield Athletics and Schutt Sports.

174. The only explanation for employees of Schutt Sports and Xenith breaching a non-disclosure agreement in order to discuss the S.A.F.E.Clip was to

coordinate their opposition to the product and further lessen competition from Mayfield Athletics and other Add-on manufacturers.

Defendants Have Common Motive to Conspire

175. Defendant Helmet Manufacturers have multiple common motives to use their control and influence over NOCSAE – as well as concerted action amongst themselves – to exclude Add-ons from their respective markets. These common motives include maintaining higher prices for helmets and reconditioning parts, reducing or eliminating the need to compete on innovation, and insulating Helmet Manufacturer Defendants from potential product liability lawsuits.

176. The exclusion of Add-ons allows Helmet Manufacturer Defendants to maintain higher prices for football helmets and reconditioning parts.

177. The availability of Add-ons and their corresponding safety and quality improvements put competitive pressure on helmet manufacturers to lower the price of football helmets that lack those features. For example, the S.A.F.E.Clip, significantly reduces a player's risk of concussion by 35% according to Mayfield Athletics' testing. If players could use the S.A.F.E.Clip in Organized Play, they would do so and demand lower prices for helmets that do not provide the same level of protection as a helmet with the S.A.F.E.Clip. The desire to avoid this downward

pressure on pricing motivates the Helmet Manufacturer Defendants' agreements to exclude Add-ons.

178. The availability of Add-ons could also influence a consumer's choice to recondition a helmet rather than purchase a new one, thus depriving Helmet Manufacturer Defendants of new helmet sales. That is because Add-ons such as the S.A.F.E.Clip could be applied to helmets during reconditioning as alternative to OEM reconditioning parts, thus allowing a consumer's existing helmet to match or surpass the safety efficacy of the Helmet Manufacturer Defendants' new helmets. In response to this competitive pressure, Helmet Manufacturer Defendants would need to lower new helmet prices to entice consumers away from reconditioning. The desire to avoid this downward pressure on pricing also motivates the Helmet Manufacturer Defendants' agreements to exclude Add-ons.

179. The exclusion of Add-ons reduces or eliminates the need for Helmet Manufacturer Defendants to compete on innovations.

180. Competing on safety innovations would require Helmet Manufacturer Defendants to increase their research and development expenditure. This would drive up the cost to produce each helmet, thus reducing the Helmet Manufacturer Defendants' overall margins. The desire to avoid the downward pressure on helmet

prices, or the increased expenditure associated with improving helmets, motivates the Helmet Manufacturer Defendants' conspiracy to exclude Add-ons.

181. The exclusion of Add-ons reduces the Helmet Manufacturer Defendants' potential exposure to product liability lawsuits.

182. Helmet Manufacturer Defendants face potential legal exposure due to concussions and other injuries arising from football play under theories of product liability. To defend against these lawsuits, the Helmet Manufacturer Defendants would likely argue that they could not practicably manufacture a helmet that would better reduce the risk of concussion or other injury.

183. The Helmet Manufacturer Defendants currently insulate themselves from this threat of litigation by agreeing not to compete with one another based on claims associated with safety. To this end, they have used their control over NOCSAE's football-helmet standards development to compel NOCSAE to prohibit any helmet manufacturer (or Add-on manufacturer) from advertising their SI score results from NOCSAE testing. Instead, the Helmet Manufacturer Defendants require that NOCSAE maintain its testing as pass-fail, with the result that a helmet with a better SI score cannot be advertised as superior to a helmet with a worse SI score. Indeed, David Halstead, acting on behalf of NOCSAE, has even specifically contacted Zuti to demand that it remove online advertising referring to its SI score.

184. The existence of third-party Add-ons that improve helmets' safety performance may provide evidence of practicable ways Helmet Manufacturer Defendants could themselves improve their helmets' design.

185. Even if product liability lawsuits were not ultimately successful, the existence and success of Add-ons such as the S.A.F.E.Clip would likely increase the number of lawsuits against which the Helmet Manufacturer Defendants would need to defend, as well as raise the costs associated with defending them.

The Football Helmet Market Is Highly Susceptible to Collusion

186. The football helmet market is also highly susceptible to collusive agreements agreement among Helmet Manufacturer Defendants:

a. The football helmet market is an oligopoly, with Riddell and Schutt Sports controlling approximately 90% of the market collectively, and Xenith controlling the remaining approximately 10%.

b. Football helmets are fungible products. A customer's decision whether to use a Riddell, Schutt Sports, or Xenith helmet is based predominately on price.

c. Demand for football helmets is inelastic. All leagues governing Organized Play require players to wear football helmets.

187. Because of the power of the Helmet Manufacturer Defendants in the football helmet market, they have been able to control outright or control the supply of products in the markets for reconditioning parts and for the various Add-ons.

The Agreement among Helmet Manufacturer Defendants and NOCSAE is *Per Se* Unlawful

188. The agreement among the Helmet Manufacturer Defendants and NOCSAE is also in the nature of an unlawful "group boycott". Specifically, it is an agreement among NOCSAE and the Helmet Manufacturer Defendants to boycott customers that attempt to use the Plaintiff's S.A.F.E.Clip or other football helmet Add-ons. By voiding the NOCSAE certification whenever the Add-on are used, the Helmet Manufacture Defendants are effectively refusing to sell "certified" helmets to customers that attempt to use the Add-ons. An agreement like this among firms with market power to boycott customers in order to discourage them from doing business with a competitor is unlawful *per se* under United States antitrust laws because they are "one of the classes of restraints which from their nature or character are unduly restrictive, and hence forbidden by both the common law and the statute." Radiant Burners v. Peoples Gas Co., 364 U.S. 656, 659-60 (1961) (internal citations omitted).

Harm to Competition

189. The individual Licensing Agreements between NOCSAE and the Helmet Manufacturer Defendants and the agreement among NOCSAE and the Helmet Manufacturer Defendants to exclude Add-ons from use in Organized Play have substantially harmed competition in the markets for NOCSAE-certified football helmets, football helmet reconditioning parts, football face guards, faceguard clips, and markets for other Add-ons such as chin straps, shock absorbers, and outer protectors.

190. The agreements between NOCSAE and the Helmet Manufacturer Defendants have had substantial, adverse competitive effects in the market for NOCSAE-certified football helmets.

a. The exclusion of Add-ons and their corresponding safety and quality improvements have allowed Helmet Manufacturer Defendants to avoid competitive pressure to incorporate similar features in their football helmet designs or to lower the price of football helmets that lack those features. For example, the S.A.F.E.Clip, significantly reduces a player's risk of concussion by 35% according to Mayfield Athletics' testing. If players could use the S.A.F.E.Clip in Organized Play this would put competitive pressure on the Helmet Manufacturer Defendants to incorporate similar or competing

alternative safety improvements into their helmets or to lower the prices of helmets that lack these improvements. Agreements that exclude Add-ons from use in Organized Play thus have resulted in higher market prices and reduced quality for football helmets than would otherwise have occurred if free and unfettered competition from Add-ons were permitted.

b. The exclusion of Add-ons encourage consumers to purchase new helmets rather than reconditioning their current helmets, thus increasing Helmet Manufacturer Defendants' revenue by imposing higher costs on consumers. The availability of Add-ons such as the S.A.F.E.Clip or Shockstrip could entice consumers to choose to recondition their helmet more often rather than buying a new model from the Helmet Manufacturer Defendants at a price higher than that of reconditioning. In response to this, Helmet Manufacturer Defendants would need to reduce their helmet prices to make them more competitive than the reconditioning alternative. Agreements that exclude Add-ons thus have an additional adverse price effect on the market for football helmets by reducing the competitiveness of reconditioning as an alternative to a new football helmet.

191. The agreements between NOCSAE and the Helmet Manufacturer Defendants have had substantial adverse competitive effects in the market for reconditioning parts that do not void the helmet's NOCSAE certification. Some Add-ons are direct substitutes for reconditioning parts. For example, Mayfield Athletics' S.A.F.E.Clip is interchangeable with OEM faceguard clips that are replaced during reconditioning. The availability of Add-ons and their corresponding safety and quality improvements put competitive pressure on Helmet Manufacturer Defendants to incorporate similar features in their reconditioning parts, or to lower the price of their existing parts that lack such features. Agreements that exclude Add-ons from use in Organized Play thus have resulted in higher market prices and reduced quality for football helmet reconditioning parts than would otherwise have occurred if free and unfettered competition from Add-ons were permitted.

192. The agreements between NOCSAE and the Helmet Manufacturer Defendants have had substantial adverse competitive effects in the market for football helmet faceguards that do not void the helmet's NOCSAE certification. Third-party faceguards are treated as Add-ons by NOCSAE and the Helmet Manufacturer Defendants. Some third-party faceguard Add-ons are direct substitutes for faceguards sold by Helmet Manufacturer Defendants. For example, the Zuti BrickhouZe, Crusader, and Shield model faceguards are designed as replacements for the Riddell Speedflex OEM faceguard. The availability of third-

party faceguard Add-ons, and their corresponding safety and quality improvements, put competitive pressure on Helmet Manufacturer Defendants to incorporate similar features in their existing faceguards, or to lower the price of their existing faceguards that lack such features. The agreements that exclude third-party faceguard Add-ons from use in Organized Play thus have resulted in higher market prices and reduced quality for faceguards than would otherwise have occurred if free and unfettered competition from Add-ons were permitted.

193. The agreements between NOCSAE and the Helmet Manufacturer Defendants have had substantial adverse competitive effects in the market for faceguard clips that do not void a helmet's NOCSAE certification. Third-party faceguard clips are treated as Add-ons by NOCSAE and the Helmet Manufacturer Defendants. Some third-party faceguard clips are direct substitutes for faceguard clips sold by helmet manufactures. For example, the S.A.F.E.Clip is designed as a replacement for the OEM faceguard clips. The availability of third-party faceguard clips, and their corresponding safety and quality improvements, put competitive pressure on Helmet Manufacturer Defendants to incorporate similar features in their existing faceguard clips, or to lower the price of their existing faceguard clips that lack such features. The agreements that exclude third-party faceguard clips from use in Organized Play thus have resulted in higher market prices and reduced quality

for faceguard clips than would otherwise have occurred if free and unfettered competition from Add-ons were permitted.

194. The agreements between NOCSAE and the Helmet Manufacturer Defendants have had substantial adverse competitive effects in other markets for football helmet Add-ons that do not void a helmet's NOCSAE certification. Some third-party Add-ons are direct substitutes for OEM parts sold or authorized for sale by Helmet Manufacture Defendants. For example, the Wegener Safety Latch is an alternative to OEM chin straps. These alternative third-party Add-ons compete directly with the products sold or authorized for sale by the Helmet Manufacturer Defendants. The availability of third-party Add-ons as alternative to OEM parts, and their corresponding safety and quality improvements, put competitive pressure on Helmet Manufacturer Defendants to incorporate similar features in their existing products, or to lower the price of their existing products that lack such features. The agreements that exclude third-party Add-ons from use in Organized Play thus have resulted in higher market prices and reduced quality for products with which third-party Add-ons directly compete than would otherwise have occurred if free and unfettered competition from Add-ons were permitted.

195. The agreements between NOCSAE and the Helmet Manufacturer Defendants have also had the substantial adverse competitive effects of reducing

innovation among existing Add-on manufacturers or entry by new Add-on manufacturers. Because Add-on manufacturers have been excluded from the market, they struggle to recoup their research and development costs. This limits their ability to continue refining their Add-on products or developing new ones. In addition, potential new Add-on manufacturers may never enter the market because of the inability to generate revenue on account of the agreements among Defendants. The agreements that exclude third-party Add-ons from use in Organized Play have thus resulted in less innovation among Add-ons and, potentially, higher prices.

Mayfield Athletics Has Experienced Antitrust Injury and Damages

196. Because of Defendants' conduct, Mayfield Athletics has experienced antitrust injury and damages in the form of lost sales of the S.A.F.E.Clip in markets where Defendants have colluded to exclude Mayfield Athletics from competing.

197. Mayfield Athletics' target market for the sale of the S.A.F.E.Clip includes over six million football participants (i.e., approximately 4,100,000 participants at the high school level, approximately 1,000,000 participants at the junior level, approximately 81,000 participants at the college level, and approximately 1,800 participants at the professional level), comprising a total potential market of approximately $782,000,000 for football safety equipment and accessories.

198. Defendants' conspiracy and agreements to allow Helmet Manufacturer Defendants to void NOCSAE certification and to eliminate the various markets for Add-ons (including the market for faceguard clips) has led prospective purchasers of the S.A.F.E.Clip not to purchase the product.

199. For example, following the statement by one or more agents, employees, and/or representatives of Schutt Sports to dealers at a Sports, Inc. show on June 18, 2019 that use of the S.A.F.E.Clip would void a helmet's warranty, Sports, Inc. dealers declined to purchase S.A.F.E.Clips. Their decision was because of the statements made by Schutt Sports representatives and the Helmet Defendants' policy to void NOCSAE certification.

200. Helmet Manufacturer Defendants' statements and representations significantly harmed Mayfield Athletics' potential sales, as Sports, Inc., is a sporting goods buying organization with more than 500 members and 750 sales locations throughout all 50 states and Canada.

201. As another example, Bob Fawley, President of Capital Varsity Sports, based in Oxford, Ohio, stated that he would "love" to sell the S.A.F.E.Clip but that he could not offer S.A.F.E.Clips in the reconditioning market unless and until they are approved by the helmet manufacturers, as he could not risk his business (by utilizing or offering the S.A.F.E.Clip) until that occurs.

202. Helmet Manufacturers' policies to void NOCSAE certification pursuant to the Licensing Agreements thus significantly harmed Mayfield Athletics' potential sales, as Capital Varsity Sports is a Team Sports Dealer and Sporting Goods Equipment Reconditioner, which reconditions and sells sports equipment throughout Michigan, Ohio, and Kentucky.

203. As another example, Jeff Lester, a Riddell sales representative, spoke to a representative named "Erin" from Riddell's marketing department during a Detroit Lions Event at Pontiac High School on July 25, 2019, regarding the use of the S.A.F.E.Clip on Riddell football helmets. Erin informed Mr. Lester that using the S.A.F.E.Clip on a Riddell helmet would violate the helmet's warranty.

204. As another example, on June 12, 2019, Mayfield Athletics discussed selling the S.A.F.E.Clip to Georgetown University's football team, but Sgarlata, the head coach of Georgetown's football program, stated that, unless a part came from a helmet manufacturer, he would not use it.

205. As another example, Mayfield Athletics entered into discussions with Jackson High School in Jackson, Michigan to purchase S.A.F.E.Clips. However, a representative of Riddell told Jackson High School's head coach that using the S.A.F.E.Clip would void the warranty.

206. As yet another example, the equipment manager of Brookfield Central

High School in Brookfield, Wisconsin, asked the Riddell representative for the high school about the installation of S.A.F.E.Clips on Riddell helmets. The representative informed him that Riddell would no longer "cover the insurance" in the event of an injury. Joel Nellis, the head coach of the Brookfield Central High School football team, subsequently contacted Mayfield Athletics and noted that Riddell's statements regarding liability in the event of an injury might be an issue that could limit sales of the S.A.F.E.Clip, even though the S.A.F.E.Clip "seem[s] like a very useful product."

207. Upon information and belief, NOCSAE has actively discouraged potential purchasers of the S.A.F.E.Clip and other Add-ons from purchasing those products if a consumer contacts NOCSAE regarding the product. NOCSAE's justification is that Helmet Manufacturer Defendants have the sole authority to void NOCSAE certification on their helmets and would do so.

208. The injury suffered by Mayfield Athletics flows directly from the Defendants' conduct that harms competition. Mayfield Athletics has suffered damages because it has been excluded from the marketplace. Mayfield Athletics' exclusion has resulted in increased prices for football helmets, reconditioning parts, and Add-ons.

Other Add-on Manufacturers Have Suffered Injury

209. Mayfield is not alone in suffering injury. NOCSAE and the Helmet Defendants' scheme has been successful in blocking or reducing the sales of other Add-on manufacturers as well.

210. Unlike other Add-on products, NOCSAE has developed a standard for faceguards. (Exhibit D.) Zuti faceguards meet this standard, as do faceguards produced by Helmet Manufacturer Defendants.

211. However, NOCSAE *also* treats faceguards as subject to its Add-on policy. As such, NOCSAE allows Helmet Manufacturer Defendants to void the NOCSAE certification of any helmet using a third-party faceguard such as the Zuti BrickhouZe, Crusader, or Shield. Thus, *regardless* of any testing results and *regardless* of the fact that NOCSAE standards exist for facemasks, Helmet Manufacturer Defendants are free to void NOCSAE certification for any helmet using a Zuti faceguard.

212. Zuti has since marketed its faceguards as Add-ons for the Riddell Speedflex helmet on its website, via social media, and through attendance at equipment expos. It sells approximately 6-10 units during the offseason and one mask per day during the season. All sales thus far are direct-to-consumer.

213. Zuti has not managed any sales to entire teams. One reason is that equipment managers and players are concerned that using a faceguard not

manufactured by the Helmet Manufacturer Defendants is "illegal." Specifically, they have expressed concern that using a Zuti faceguard will void either the "warranty" or NOCSAE certification, thus rendering the helmet ineligible for play.

214. As a result of these actions pursuant to the unlawful agreements between NOCSAE and the Helmet Manufacturer Defendants, Zuti has suffered limited sales and customers have been denied access to its safer product.

215. Shockstrip, the manufacturer of the Shockstrip, has repeatedly attempted to market its product and engaged in testing. However, Shockstrip has not received certification for its product as an Add-on, nor has it successfully assumed the NOCSAE certification for any helmet tested in conjunction with the Shockstrip.

216. Instead, David Halstead, the NOCSAE Technical Director, has actively discouraged customers from purchasing the Shockstrip. In addition, by information and belief, Helmet Manufacturer Defendants require Shockstrips to be removed from any helmets submitted for reconditioning bearing a Shockstrip.

217. As a result of these actions pursuant to the unlawful agreements between NOCSAE and the Helmet Manufacturer Defendants, Shockstrip has suffered limited sales and customers have been denied access to its safer product.

218. By information and belief, as a result of actions pursuant to the

unlawful agreements between NOCSAE and the Helmet Manufacturer Defendants, Guardian Sports has suffered reduced sales for its Guardian Cap, and customers have been denied access to its safer product and limited to using it only during practice.

COUNT I
THE LICENSING AGREEMENT VIOLATES THE SHERMAN ACT, SECTION 1 AND MICHIGAN ANTITRUST REFORM ACT, SECTION 2

219. Mayfield Athletics restates and realleges the allegations of paragraphs 1-218 above hereof, as if fully restated herein.

220. NOCSAE has formed multiple contracts, combinations, and/or conspiracies with Riddell, Schutt Sports, and Xenith within the meaning of Section 1 of the Sherman Act, 15 U.S.C. § 1, and Section 2 of the Michigan Antitrust Reform Act, MCL 445.772.

221. Pursuant to the conspiracy, Riddell, Schutt Sports, and Xenith have each entered into Licensing Agreements with NOCSAE that permit them to decertify any football helmets to which consumers have applied helmet Add-ons *regardless* of whether the helmet and Add-on collectively meeting NOCSAE standards.

222. The conspiracy has caused substantial anticompetitive effects.

223. The conspiracy unreasonably restrains trade in violation of Section 1 of the Sherman Act, 15 U.S.C. § 1, and Section 2 of the Michigan Antitrust Reform

Act, MCL 445.772.

224. The conspiracy has caused substantial anticompetitive effects.

225. The conspiracy unreasonably restrains trade in violation of Section 1 of the Sherman Act.

226. As a direct and proximate result of the Licensing Agreement and its continued use to allow Helmet Manufacturers to void NOCSAE certifications, Mayfield Athletics has suffered injury and damages in an amount of at least $10 million, before trebling, which continues to accrue and will be fully proven at trial.

227. This is a continuing conspiracy and the anticompetitive effects and damages will continue unless enjoined.

COUNT II
CONSPIRACY TO RESTRAIN TRADE IN VIOLATION OF SHERMAN ACT, SECTION 1 AND MICHIGAN ANTITRUST REFORM ACT, SECTION 2

228. Mayfield Athletics restates and realleges the allegations of paragraphs 1-218 above hereof, as if fully restated herein.

229. Riddell, Schutt Sports, Xenith and NOCSAE have formed a contract, combination, and/or conspiracy within the meaning of Section 1 of the Sherman Act, 15 U.S.C. § 1, and Section 2 of the Michigan Antitrust Reform Act, MCL 445.772.

230. Pursuant to the conspiracy, Riddell, Schutt Sports, Xenith and NOCSAE have each agreed among themselves to decertify any football helmets to

which consumers have applied helmet Add-ons *regardless* of whether the helmet and Add-on collectively meeting NOCSAE standards.

231. The conspiracy has caused substantial anticompetitive effects.

232. The conspiracy unreasonably restrains trade in violation of Section 1 of the Sherman Act, 15 U.S.C. § 1, and Section 2 of the Michigan Antitrust Reform Act, MCL 445.772.

233. The conspiracy has caused substantial anticompetitive effects.

234. The conspiracy unreasonably restrains trade in violation of Section 1 of the Sherman Act.

235. As a direct and proximate result of the conspiracy among defendants to exclude Add-on manufacturers from their respective markets, Mayfield Athletics has suffered injury and damages in an amount of at least $10 million, before trebling, which continues to accrue and will be fully proven at trial.

236. This is a continuing conspiracy and the anticompetitive effects and damages will continue unless enjoined.

COUNT III
TORTIOUS INTERFERENCE
WITH A BUSINESS RELATIONSHIP OR EXPECTANCY
(SCHUTT SPORTS)

237. Mayfield Athletics restates and realleges the allegations of paragraph 1-218 above hereof, as if fully restated herein.

238. Mayfield Athletics has ongoing business relationships and business

expectancies with football teams, football players, football equipment distributors, and other purchasers of football equipment throughout the United States.

239. Mayfield Athletics has a reasonable business expectancy of obtaining thousands of additional customers.

240. Schutt Sports is aware of these relationships and this expectancy. Potential customers have specifically asked Helmet Manufacturers, including Schutt Sports, about use of helmet Add-ons such as the S.A.F.E.Clip, and Schutt Sports has stated that any use of a helmet Add-on would result in Schutt Sports decertifying the helmet and making it ineligible for use at every level of Organized Play.

241. Schutt Sports knowingly interfered with Mayfield Athletics' prospective economic relationship with football teams and football players without privilege or justification through the acts described above. Schutt Sports undertook its actions pursuant to its Licensing Agreement with NOCSAE, as well as to forward its conspiracy with Helmet Manufacturers as described above, and not to serve any proper business or societal purpose.

242. Schutt Sports interfered not only with Mayfield Athletics' prospective economic advantage, but the interests of football players whom Mayfield Athletics wishes to serve.

243. Schutt Sports' intentional and improper interference has damaged Mayfield Athletics.

COUNT IV
TORTIOUS INTERFERENCE
WITH A BUSINESS RELATIONSHIP OR EXPECTANCY
(RIDDELL)

244. Mayfield Athletics restates and realleges the allegations of paragraph 1-218 above hereof, as if fully restated herein.

245. Mayfield Athletics has ongoing business relationships and business expectancies with football teams, football players, football equipment distributors, and other purchasers of football equipment throughout the United States.

246. Mayfield Athletics has a reasonable business expectancy of obtaining thousands of additional customers.

247. Riddell is aware of these relationships and this expectancy. Potential customers have specifically asked Helmet Manufacturers, including Riddell, about use of helmet Add-ons such as the S.A.F.E.Clip, and Riddell has stated that any use of a helmet Add-on would result in Riddell decertifying the helmet and making it ineligible for use at every level of Organized Play.

248. Riddell knowingly interfered with Mayfield Athletics' prospective economic relationship with football teams and football players without privilege or justification through the acts described above. Riddell undertook its actions

pursuant to its Licensing Agreement with NOCSAE, as well as to forward its conspiracy with Helmet Manufacturers as described above, and not to serve any proper business or societal purpose.

249. Riddell interfered not only with Mayfield Athletics' prospective economic advantage, but the interests of football players whom Mayfield Athletics wishes to serve.

250. Riddell's intentional and improper interference has damaged Mayfield Athletics.

COUNT V
TORTIOUS INTERFERENCE
WITH A BUSINESS RELATIONSHIP OR EXPECTANCY
(XENITH)

251. Mayfield Athletics restates and realleges the allegations of paragraph 1-218 above hereof, as if fully restated herein.

252. Mayfield Athletics has ongoing business relationships and business expectancies with football teams, football players, football equipment distributors, and other purchasers of football equipment throughout the United States.

253. Mayfield Athletics has a reasonable business expectancy of obtaining thousands of additional customers.

254. Xenith is aware of these relationships and this expectancy. Potential customers have specifically asked Helmet Manufacturers, including Xenith, about

use of helmet Add-ons such as the S.A.F.E.Clip, and Xenith has stated that any use of a helmet Add-on would result in Xenith decertifying the helmet and making it ineligible for use at every level of Organized Play.

255. Xenith knowingly interfered with Mayfield Athletics' prospective economic relationship with football teams and football players without privilege or justification through the acts described above. Xenith undertook its actions pursuant to its Licensing Agreement with NOCSAE, as well as to forward its conspiracy with Helmet Manufacturers as described above, and not to serve any proper business or societal purpose.

256. Xenith interfered not only with Mayfield Athletics' prospective economic advantage, but the interests of football players whom Mayfield Athletics wishes to serve.

257. Xenith's intentional and improper interference has damaged Mayfield Athletics.

COUNT VI
TORTIOUS INTERFERENCE
WITH A BUSINESS RELATIONSHIP OR EXPECTANCY
(NOCSAE)

258. Mayfield Athletics restates and realleges the allegations of paragraph 1-218 above hereof, as if fully restated herein.

259. Mayfield Athletics has ongoing business relationships and business

expectancies with football teams, football players, football equipment distributors, and other purchasers of football equipment throughout the United States.

260. Mayfield Athletics has a reasonable business expectancy of obtaining thousands of additional customers.

261. NOCSAE is aware of these relationships and this expectancy. Potential customers have specifically asked NOCSAE about use of helmet Add-ons such as the S.A.F.E.Clip, and NOCSAE has stated that any use of a helmet Add-on would result in Helmet Manufacturers decertifying the helmet and making it ineligible for use at every level of Organized Play.

262. NOCSAE knowingly interfered with Mayfield Athletics' prospective economic relationship with football teams and football players without privilege or justification through the acts described above. NOCSAE undertook its actions pursuant to its Licensing Agreement with Helmet Manufacturers and not to serve any proper business or societal purpose.

263. NOCSAE interfered not only with Mayfield Athletics' prospective economic advantage, but the interests of football players whom Mayfield Athletics wishes to serve.

264. NOCSAE's intentional and improper interference has damaged Mayfield Athletics.

RELIEF REQUESTED

265. WHEREFORE, Mayfield Athletics asks this Court to grant the following relief:

a. Permanently enjoin Defendants from entering into, or from honoring or enforcing, any agreements that restrict manufacturers of football helmet Add-ons from obtaining NOCSAE certification for any football helmet that meets NOCSAE standards when tested in combination with an Add-on.

b. Award Mayfield Athletics three times its damages, plus its reasonable attorneys' fees, against defendants, jointly and severally pursuant to the Sherman Act, Clayton Act and Michigan Antitrust Reform Act.

c. Award Mayfield Athletics its actual damages from Defendants' tortious interference with a business expectancy.

d. Award Mayfiled Athletics pre- and post-judgment interest on all damages.

e. Award Mayfield Athletics its reasonable attorneys' fees and costs as otherwise provided by contract, statute or court rules.

f. Award such other relief as this Court finds just.

JURY DEMAND

266. Mayfield Athletics hereby demands a trial by jury on all issues so triable.

September 9, 2020

K&L GATES LLP

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CERTIFICATE OF SERVICE

The undersigned certifies that on October 20, 2020, this document was electronically filed with the Clerk of the Court using the CM/ECF system.

s/ Christopher M. Wyant
Christopher M. Wyant

Exhibit A

NOCSAE
Protecting athletes since 1970
50 YEARS
National Operating Committee on Standards for Athletic Equipment

FAQs

Following are frequently asked questions and answers concerning NOCSAE policies and procedures, adoption and enforcement of the standards, and issues related to safety and specific sports athletic equipment.

NOCSAE welcomes questions and encourages you to reach out to us directly for additional information. Please email NOCSAE Executive Director, Mike Oliver.

NOCSAE General

- How are NOCSAE standards enforced?
- How can I determine if a product meets the NOCSAE standard?
- Does the NOCSAE logo have to be embossed on equipment such as helmets and face guards?
- What penalty will be imposed if an athlete is not wearing certified protective equipment mandated by the rules?
- How do add-on products impact helmets certified to the NOCSAE standard?
- Can a helmet which bears the NOCSAE seal be altered or repaired without legal ramifications?
- What is NOCSAE's Severity Index (SI)?
- Why is the Severity Index (SI) threshold 1200? Would a lower SI threshold provide more protection?
- What risks do athletes and parents need to understand when it comes to participation in sports, even when using athletic equipment that meets the NOCSAE standard?
- Why do helmets certified to the NOCSAE standard include a warning label?
- Does NOCSAE certify athletic equipment?

Recertification

- How does the NOCSAE recertification process work?
- How often does NOCSAE require that a football helmet be recertified?
- How long will helmets stay in certified condition?
- What happens when a helmet no longer meets the standard?
- Which reconditioners can recertify previously certified football helmets?
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NOCSAE General

What is NOCSAE?

The National Operating Committee on Standards for Athletic Equipment or NOCSAE (pronounced “noxey”) is an independent and nonprofit standards development body with the sole mission to enhance athletic safety through scientific research and the creation of performance standards for athletic equipment. Since its inception in 1969, NOCSAE has been a leading force in the effort to improve athletic equipment, and to reduce injuries through robust standards for athletic equipment.

NOCSAE was originally formed in response to a need for a performance test standard for football helmets. In 1973, the NOCSAE Football Helmet Standard was developed and new helmet models were first tested to this standard in 1974. The first baseball batting helmet standard was published in 1981, and helmet models were tested to this standard beginning in

1983. The baseball standard has since been designated as the baseball/softball batting helmet standard. In 1986 a performance test standard was published for lacrosse helmets and face guards, and in 1987, a standard for football face guards was released.

Today, NOCSAE has 49 performance and test standards for a wide range of sports and continues to investigate other athletic equipment to determine the feasibility or necessity of establishing additional standards. NOCSAE standards are constantly being updated to reflect the latest science, technology and medicine.

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What is NOCSAE's role?

NOCSAE develops voluntary performance and test standards for athletic equipment that are available for adoption by any athletic regulatory body. Numerous national and international regulatory bodies for sports require NOCSAE standards, including the NFL, NCAA, National Federation of State High School Associations (NFHS), International Federation of American Football, USA Football, US Lacrosse and the United States Department of Defense Education Activity which oversees and regulates military base athletic programs for the children of military families around the world.

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Who is NOCSAE?

NOCSAE's board of directors represent a diverse and passionate group of sports and medical professionals that have joined forces for the common goal of reducing sports-related injuries. Serving without compensation, NOCSAE's board of directors is comprised of representatives from the American College Health Association, American Orthopaedic Society for Sports Medicine, American College of Sports Medicine, American Medical Society for Sports Medicine, American Academy of Pediatrics, Athletic Equipment Managers Association, American Football Coaches

Association, National Athletic Equipment Reconditioners Association, National Athletic Trainers Association, Sports & Fitness Industry Association. Non-voting members of the board include the National Collegiate Athletic Association (NCAA) and the National Federation of State High School Associations (NFHS).

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How is NOCSAE funded?

NOCSAE is an independent, nonprofit 501(c)(3) organization funded primarily through licensing fees it charges to equipment manufacturers that want to have their equipment certified or recertified to NOCSAE standards.

Approximately 75 to 80 percent of all revenue collected from these license fees is reinvested into education and research to advance the science and safety of athletes. Manufacturers and reconditioners are obligated by contract license agreement with NOCSAE to maintain detailed quality control and quality assurance programs which include testing randomly selected helmets during production to make sure they meet the NOCSAE standards.

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How does NOCSAE create and set standards?

NOCSAE standards are created, revised and approved by the NOCSAE Standards Committee, which serves as a consensus body in accordance with the American National Standards Institute (ANSI) due process requirements for standards development bodies. The NOCSAE standard is an objective pass/fail standard, not a comparative standard. NOCSAE standards are constantly being updated to reflect the latest science, technology and medicine.

The makeup of the NOCSAE Standards Committee is inclusive of all materially affected interests that may be impacted by its standards. The requires that a balance of interests always be

maintained on the Standards Committee, and these requirements prevent any single interest from dominating the Standards Committee or the development, promulgation, or revision of a standard.

NOCSAE invites anyone who may be impacted by a standard to be involved in its development, including those who represent the sports and medical communities, manufacturers, parents and others. Interested parties are encouraged to submit comments, suggestions, objections or other responses to any standards under consideration or existing standards. This openness and invitation to participation in the standards development process complies with ANSI due process guidelines.

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How can I get a copy of a standard?

The current standards and any proposed revisions or modifications are available in the NOCSAE Standards section of our website.

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How are products certified to the NOCSAE standards?

NOCSAE sets performance and test standards for athletic equipment. **NOCSAE does not certify or approve athletic equipment.** Safety Equipment Institute (SEI) oversees the certification of athletic equipment to NOCSAE standards.

Since 2015, NOCSAE has required third-party certification of compliance with NOCSAE standards. Third-party certification enhances the integrity of all NOCSAE standards, giving athletes confidence that their athletic equipment has been tested by a neutral, independent body to meet the highest performance standards. This is the most stringent and unbiased way to determine standards compliance, as the third party cannot have any connection to manufacturers or products they certify. NOCSAE is the only athletic equipment standards development organization that mandates independent third-party certification

of compliance, in accordance with ANSI/ISO 17065 international guidelines. Learn more in the Certification section of our website or at the SEI website: www.seinet.org

Both the manufacturer and SEI as the certifying body have the right, under the NOCSAE standards, to declare a certification void if the certified product is altered after certification and made available for sale. A model is certified in the condition and configuration it is offered for sale to the public. An alteration or addition to that configuration after sale may change the performance characteristics.

Manufacturers seeking to certify their products to NOCSAE standards will need to submit necessary testing fees, product testing samples, product labels, quality program manuals and other required materials to SEI. Manufacturers also will participate in a quality audit and review protocols for responding to customer complaints regarding product performance.

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How are NOCSAE standards enforced?

NOCSAE does not possess a surveillance force to ensure compliance with the standards. The standards are voluntary and are available for adoption by any equipment manufacturer, user group or athletic regulatory body. However, if a firm affixes the NOCSAE seal to its helmets, it accepts the responsibility that all of those helmets meet the appropriate NOCSAE standards. Likewise, it is the responsibility of a reconditioner to recertify that all helmets to which the firm affixes its seal of recertification meet the NOCSAE standard applicable at the time the helmet was originally manufactured. If a helmet with a NOCSAE seal attached is found deficient, notice should be given to the NOCSAE board of directors or to the executive director.

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How can I determine if a product meets the NOCSAE standard?

Look for the NOCSAE logo. The "Meets NOCSAE Standard" logo confirms that a sports equipment product meets the latest science, technology and medicine criteria, providing the best possible protection for that athlete. The logo indicates that compliance with the NOCSAE standard has been independently certified by Safety Equipment Institute (SEI). All athletic equipment products that meet the NOCSAE standard are certified by SEI and a complete list of certified products is available on their website at www.seinet.org.

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Does the NOCSAE logo have to be embossed on equipment such as helmets and face guards?

The NOCSAE standards require that the logos and warnings be "permanent" as that word is defined in document ND001-17m17b:

> "Permanent (Label/Marking) – A label, or similar marking, that cannot be readily (1), removed without leaving a trace of its previous existence (2), erased or (3), smudged to the point that it is illegible. If it requires chemical or mechanical means such as the use of solvents, abrasives, grinding, etc., to remove a label or marking, then that label or marking is acceptable."

Many helmets will have the logos embossed or stamped into the shell, but others may use a permanent label or printing to accomplish the same goal. As long as the label is permanent as defined above, the equipment labeling requirement is satisfied.

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What penalty will be imposed if an athlete is not wearing certified protected equipment mandated by the rules?

For specific rules and requirements regarding athletic equipment used in football, baseball/softball and lacrosse, the respective rules-making groups of the sponsoring organization would be contacted, i.e., the National Collegiate Athletic

Association (NCAA), the National Federation of State High School Associations (NFHS), etc. There may be some circumstances where the use of non-certified equipment constitutes the use of illegal equipment and could result in player disqualification.

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How do add-on products impact helmets certified to the NOCSAE standard?

Helmets should not be altered. Add-on accessories can change a helmet and interfere with performance in ways unintended by the manufacturer. The helmet's original padding, fit and components were tested for compliance with the NOCSAE standards, and altering these components may result in a helmet that does not perform as designed, and could increase the risk of injury. A manufacturer can declare a product's certification to the NOCSAE standard void if its product is altered.

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Can a helmet which bears the NOCSAE seal be altered or repaired without legal ramifications?

A helmet should not be altered. Any change or modification in the configuration of the shell or liner materials from manufacturing specifications could substantially alter the performance of the helmet as a unit, causing a change in helmet performance, and possibly exposing the individual responsible to liability. Individual helmet models are certified in the condition and configuration in which they were manufactured, and any alteration, modification, or change from the manufacturing specifications could affect the model's performance on the NOCSAE certification test. By following proper installation procedures and using replacement parts which meet or exceed original manufacturer specifications, skilled repair of a football helmet should not affect the integrity of the energy attenuation system. It is suggested that the manufacturer be consulted before any materials are applied to

the helmet such as, but not limited to, paint, wax, thinners, solvents, vinyl tape designs, cleaning agents, etc.

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What is NOCSAE's Severity Index?

NOCSAE's Severity Index (SI) is a weighted impulse threshold criterion for a general category of significant head injuries based on scientific research and published data. SI is a method for measuring a helmet's ability to reduce linear head accelerations caused by impact forces to the helmet. SI measurements are obtained from a range of different impact velocities to multiple locations and at various angles and temperatures, and from impacts with varying projectiles and impact surfaces. Test head form size and mass vary with different size helmets to demonstrate performance across all sizes offered in a given model.

The NOCSAE helmet standard uses a pass/fail threshold of 1200 SI to determine whether a helmet meets the standard performance criteria. Each helmet must perform below 1200 SI on every impact location. Helmets that perform below 1200 SI have been shown to reduce skull fracture, TBI, and other significant head and brain injuries. **Once the 1200 SI threshold is met, there is no clinically measurable difference in injury risk based on lower SI scores.** For example, a value of 450 SI isn't more likely to reduce injury than 800 SI.

It is impractical for every individual helmet to be tested, so every certified helmet must be part of a comprehensive quality assurance/quality control (QA/QC) certification program that applies a 3 standard deviation (SD), or a 0.65 acceptance quality level (AQL) requirement to randomly selected samples that accurately and statistically represent an entire batch or production run of the same model and size. The NOCSAE mandated QA/QC program establishes to a 95% confidence level that 99+% of the untested helmets would meet the standard if every helmet was tested. This level of compliance is the toughest of all helmet QA/QC programs, including military combat

helmets and motorcycle helmets tested to federal helmet standards.

There is no single SI number for any single helmet or model. A helmet model in any given size alone may have over 10,000 different SI scores from all samples tested, depending on the number of helmets produced. NOCSAE does not allow SI-related safety claims about one model or brand over another because such claims would be scientifically unfounded and misleading to consumers.

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Why is the Severity Index (SI) threshold 1200? Would a lower SI threshold provide more protection?

Once the 1200 Severity Index (SI) threshold is met, there is no measurable difference in injury risk based on differences in SI scores. The SI value is a pass/fail threshold which is based on a number of scientific studies, but the data does not support using the SI numbers as a 'sliding scale', such that lower numbers reduce or prevent more injuries than higher numbers. For example, there is no way to determine whether a reduction of 200 SI units would result in measurable protective improvement in a helmet for all types of potential injuries. For example, it is not accurate to say that a helmet with an overall SI average of 600 is measurably better than a helmet with an overall SI average of 500. Most new and recently reconditioned helmets test far below the threshold, generally averaging in the 600-800 SI range. The ideal SI value for reducing the occurrence of one type of injury at low level hits may not be the same value for a higher impact force.

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What risks do athletes and parents need to understand when it comes to participation in sports, even when using athletic equipment that meets the NOCSAE standard?

Participation in sports requires an acceptance of risk of injury. Parents and players should understand that no helmet can

prevent all concussions, and no helmet can protect you from serious brain and/or neck injuries including paralysis or death.

Using properly certified equipment is important in reducing the risk of injury, but it is only one of several steps that athletes and parents must take to reduce injury risk and injury severity. Avoiding unnecessary head contact and following the rules which prohibit dangerous play are all necessary parts of injury prevention. And when an injury does occur, it must be addressed immediately.

Players that experience concussion symptoms including loss of consciousness or memory, dizziness, headache, nausea or confusion, should immediately stop athletic activity and report these symptoms to their coach, athletic trainer and parents. Players should not return to a game or participation in sports until all symptoms are gone and medical clearance has been confirmed. Ignoring this warning may lead to another and more serious or fatal brain injury.

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Why do helmets certified to the NOCSAE standard include a warning label?

The NOCSAE warning label requirement has long been a part of each standard and is intended to warn participants of the limitations of protection. The helmet is designed to provide additional direct protection for the head, but neither football, baseball/softball batting, baseball/softball catcher's or lacrosse helmets protect a player's neck.

NOCSAE urges that the warning statement be shared with members of the football, baseball, softball and lacrosse teams and that all coaches alert participants to the potential for injury. The wording of the warning label as set forth in the NOCSAE standard specifies the core information that must be conveyed by the label, but permits a manufacturer to add or supplement the content as it determines necessary.

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Does NOCSAE certify athletic equipment?

NOCSAE sets test and performance standards for athletic equipment, including football helmets. NOCSAE does not certify or approve athletic equipment. Safety Equipment Institute (SEI) oversees the certification of athletic equipment to NOCSAE standards. Third-party certification enhances the integrity of all NOCSAE standards, giving athletes confidence that their athletic equipment has been tested by a neutral, independent body to meet the highest performance standards.

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Recertification

How does the NOCSAE recertification process work?

NOCSAE is the only standards organization that has a provision for recertification. Headgear standards include a requirement that the original manufacturer inform the consumer of the headgear's eligibility for recertification. If it is re-certifiable then an interval of re-certification must be provided. If it is not re-certifiable then a certification life statement must be provided. This information must appear on the headgear. Recertification must be carried out in accordance with the specific NOCSAE standard applicable to the headgear type by a licensed recertification house. Currently all such entities are members of the National Athletic Equipment Re-conditioners Association. (NAERA)

More information about the recertification and reconditioning process is available on the National Athletic Equipment Reconditioners Association (NAERA) website at http://naera.net/.

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How often does NOCSAE require that helmets be recertified?

NOCSAE recommends that organizations adopt and follow a program of helmet inspection and reconditioning that meets their particular needs. For example, some schools recondition

and recertify their football helmets every year, others every two years. But in any case, recertification must take place as called for by the manufacturer.

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How long will helmets stay in certified condition?

Helmets are initially certified as part of the manufacturer's process. For helmets manufactured after 2015, the life of initial certification is provided as detailed above. The recertification process cannot extend that interval. For helmets manufactured prior to that date the interval of required recertification to maintain warranty should be used as guidance. The recertification entity may declare the helmet is recertified for only one year or may follow the original manufacturer's initial certification life as guidance to extend recertification life to not longer than that period specified by the manufacturer. Helmets prohibited from recertification by the manufacturer cannot be recertified.

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What happens when a helmet no longer meets the standard?

The helmet must not be used. In some cases, the no-longer-certified helmet can be recertified. For example, you have a re-certifiable helmet that must be re-certified every other year. But the helmet is now three years old. It was not used the last year for any number of reasons. You want to recertify the helmet and use it this year. So long as the helmet is presented to a licensed recertification entity and the helmet is not more than ten years from the date of initial certification, then it is eligible for recertification. Note: the ten year interval is set by NAERA and often helmets submitted cannot be recertified for any number of reasons other than age.

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Which reconditioners can recertify previously certified football helmets?

Information about licensed reconditioners is available on the National Athletic Equipment Reconditioners Association (NAERA) website at http://naera.net/.

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Does the NOCSAE standard require the use of specific brand name replacement parts when helmets are reconditioned?

No. The NOCSAE standard is not brand specific. Neither the test nor the performance standard call for any specific brands, materials or designs. The standard speaks only to the performance of the helmet when new, and recertification. The standard does not require the use of original equipment parts, but does require that "all components must function as originally certified" which requires OEM equivalence.

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Concussion Information

What is the helmet's role in protecting against concussions?

Helmets provide a substantial level of protection for serious head injuries, including concussions, but **no helmet can prevent all concussions**. Concussions are complex events that involve many variables that have nothing to do with helmets or head protection. Concussions are caused by impacts to the head, neck and other parts of the body that result in the movement of the brain inside the head. Concussions can occur anytime a human body collides with another or with the ground. The reality is that a helmet can't stop the brain from moving inside the head.

Changing behaviors and attitudes of players, parents and coaches is critical. Proper blocking and tackling techniques reduce the number of hits to the head which will reduce the risk of concussion and other head injuries. This includes reducing exposure by limiting full contact practices. If a concussion has

been diagnosed, your child should not return to play until cleared by medically trained experts following return-to-play guidelines.

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Does certification to the NOCSAE standard mean that a helmet prevents concussions?

A helmet certified to a NOCSAE standard provides a substantial level of protection for serious head injuries, including concussions. However, the NOCSAE helmet standard is not a concussion standard, and no helmet can prevent all concussions, even those certified to the NOCSAE standard. Currently there are no helmet standards in existence that are concussion specific. NOCSAE has been and is currently dedicating millions of dollars in concussion specific scientific research to try and identify criteria that could be used in a concussion specific helmet standard.

In 2017, NOCSAE finalized revisions to its existing football helmet standard to limit maximum rotational forces involved in many concussions. Rotational accelerations are thought by the majority of neuroscientists to be more injurious to the brain than linear accelerations. The revised football helmet standard goes into effect in November 2018 and represents a critical step forward in addressing concussion risks.

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Can the NOCSAE helmet test results be used to determine which helmet is the best helmet for protecting against concussions?

No. The NOCSAE helmet standard uses a pass/fail threshold of 1200 SI to determine whether a helmet meets the standard performance criteria. A helmet must perform below 1200 SI, by at least three statistical standard deviations in all demanding impact locations. Once the 1200 SI threshold is met, there is no measurable difference in injury risk based on differences in SI

scores. For example, a value of 450 SI isn't more likely to reduce concussion injury than 800 SI.

There is no single SI number for any single helmet or model. A helmet model in any given size alone may have over 10,000 different SI scores from all samples tested, depending on the number of helmets produced. NOCSAE does not allow SI-related safety claims about one model or brand over another because such claims would be scientifically unfounded and misleading to consumers. Regarding concussion protection claims, there is currently no scientific consensus for a concussion or sub-concussive threshold, whether that threshold is SI, accelerations in engineering units or other values. It is a misuse of SI values to make helmet comparisons, particularly when the comparative question is concussion protection.

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How is NOCSAE working to advance concussion research in sports?

Since 1995, NOCSAE has spent more than $10.5 million on concussion research by the foremost experts in sports medicine and science to develop and advance athlete safety. In 2017, NOCSAE finalized revisions to its existing football helmet standard to limit maximum rotational forces involved in many concussions. Rotational accelerations are thought by the majority of neuroscientists to be more injurious to the brain than linear accelerations. The revised football helmet standard goes into effect in November 2018 and represents a critical step forward in addressing concussion risks. NOCSAE continues to work to identify criteria that could be used in a concussion-specific helmet standard in the future.

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Commotio Cordis / Chest Protector Performance Standard for Commotio Cordis

What is commotio cordis and how does NOCSAE's chest protector performance standard protect against it?

Commotio cordis, a heart rhythm disruption caused by a blow to the chest, is one of the leading causes of sudden cardiac death in athletes. The condition is an episode of ventricular fibrillation induced by a direct blow to the chest over the heart during a specific portion of the heart's electrical cycle. This can be caused by a direct hit from an object such as a baseball or lacrosse ball, a lacrosse stick or even a collision with another player. The impact doesn't have to be hard or high velocity. Approximately five to 15 athletes die every year from this event. Most of these deaths are males under the age of 14, many of whom were wearing a form of chest protection when they were hit. Commotio cordis deaths have been recorded in baseball, lacrosse, football, and soccer, as well as in other recreational activities.

In 2017, NOCSAE finalized its chest protector standard for commotio cordis, based on a scientific breakthrough in understanding the cause and prevention of commotio cordis. In conjunction with research efforts by the Louis J. Acompora Memorial Foundation, NOCSAE funded more than $1.1 million in research to discover the precise cause of commotio cordis and then determine how to protect against it. Through a series of NOCSAE funded studies, Dr. Mark Link, M.D., identified the precise cause of commotio cordis, including the critical moment of occurrence in the cardiac cycle. With funding from NOCSAE, research engineers Cynthia Bir, PhD, and Nathan Dau, PhD, at Wayne State University were able to develop a mechanical chest surrogate that mimics the response of the human chest and heart to testing impacts. With the identification of an injury prevention threshold by Dr. Link and laboratory validation of the mechanical chest surrogate, NOCSAE developed the world's first chest protection standard specific for commotio cordis. Equipment certified to this new standard is expected to significantly reduce the risk of injury and death from commotio cordis. The new standards currently are specific to baseball and lacrosse only, but plans are being developed to include other sports.

Even the best protective equipment cannot prevent all such injuries, so it is important for coaches, parents, players and bystanders to be able to recognize the danger if an athlete is

struck in the chest and collapses. Without immediate efforts to resuscitate the victim with an automated external defibrillator (AED), death can occur within just a few minutes. Coaches, parents and athletes who have access to an AED and training in CPR will help prevent tragic outcomes from commotio cordis. When an AED is used within three minutes of a collapse, survival rates are as high as 89 percent.

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Are products currently available that meet the NOCSAE chest protector performance standard for commotio cordis? Is the standard required by sports governing bodies?

The NOCSAE chest protector performance standard for commotio cordis applies to baseball and lacrosse and it will be in effect July 1, 2018. Currently, there are several chest protectors on the market that meet the standard. For updates on products that meet the standard, visit http://www.seinet.org/search/search.php.

The new standard is a recommendation for manufacturers, but with support from US Lacrosse and the NFHS, NOCSAE is hopeful that compliance with the standard will be part of the rules of play in lacrosse and baseball very soon.

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Football

(For specific questions about concussion risks and protections, see previous section.)

How can I determine if a helmet meets the NOCSAE helmet test standard?

Helmets which meet the NOCSAE standard must bear the seal, “Meets NOCSAE standards” and the logo for that type of helmet. The seal and logo are permanently branded or stamped on the outside rear portion of the helmet.

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How does NOCSAE's football helmet standard address youth and adult players?

The NOCSAE football helmet standard applies to helmets of all sizes, worn by players of all sizes from youth to adult. The NOCSAE standards utilize variable-mass biofidelic headforms to account for the different sized players. Helmet sizes likely to be worn by players at the youth level are tested on the smallest headform which represents a 10-year-old male in the 50th percentile of head mass and shape. As helmet sizes get larger, headforms with more mass are used in the testing protocol. The largest headform represents the 95th percentile adult male for head mass and shape.

NOCSAE has been researching the potential benefits of creating a separate standard for helmets designed for youth. At this time, there is insufficient data to suggest a distinct helmet mass limit for youth or other similar performance changes would provide more injury protection, or would protect against injury risks not already addressed.

As we have for years, NOCSAE continues to prioritize this issue. We are the only standards organization actively pursuing a youth helmet standard through active research grants and contract funding. However, NOCSAE will not develop a standard without solid science from which we can conclude that taking an action such as limiting helmet mass will not present an increased risk of injury or otherwise prohibit the helmet from effectively addressing rotational acceleration-induced injuries.

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What are the most important factors when selecting a football helmet?

NOCSAE recommends that helmets be certified as compliant to the NOCSAE standard, be regularly recertified, and properly fitted to the individual athlete's head. Helmets are designed for safety and performance based on proper fit — specifically contact with the head.

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How are football helmets tested?

The NOCSAE helmet testing standards utilize a twin-wire impactor that relies on gravity to accelerate the headform and helmet combination to the required impact speeds. The standard also requires the use of a pneumatic ram impactor to deliver impacts in locations and directions that are not possible with the twin wire system. The NOCSAE headform is a biofidelic and variable-mass headform scientifically instrumented with triaxial accelerometers at the center of gravity to measure headform accelerations in three different directions.

The testing involves mounting a football helmet on an appropriately sized and mass-specific headform. The headform and helmet combination is then dropped at specific velocities onto a steel anvil covered with a ½-inch hard rubber pad. A single helmet test involves 29 impacts at seven different impact locations, including three random impact locations, four lower-velocity impacts, and four impacts at high temperatures. For the pneumatic ram testing, the helmet and headform are mounted onto a linear bearing table and impacted with a pneumatic ram at 19.6 meters per second on six different locations, including one random location. Helmets must meet the standard at all impacts in both testing configurations.

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Are all football helmet sizes tested?

No. It would not be feasible to test all helmet sizes. The most critical sizes are tested in the three or four most common shell sizes used by most equipment manufacturers. These sizes have the least amount of standoff distance between head and shell, and if these shell sizes meet the NOCSAE standard, it is reasonable to assume the other helmet sizes in that particular shell would also pass.

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Does the NFL require that players wear helmets certified to NOCSAE standards?

Yes, the NFL requires players to wear helmets that meet test and performance standards set by NOCSAE. NOCSAE does not certify or approve athletic equipment. Football helmets are certified to NOCSAE standards by Safety Equipment Institute (SEI). Third-party certification enhances the integrity of all NOCSAE standards, giving athletes confidence that their athletic equipment has been tested by a neutral, independent body to meet the highest performance standards.

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Does NOCSAE have a rule that prevents helmets that are 10 years old or older from being worn or recertified to NOCSAE standards?

No. NOCSAE does not have a rule that prevents players in the NFL or any league from wearing football helmets that are more than 10 years old. There is also no NOCSAE rule that prevents football helmets 10 years old or older from being recertified to NOCSAE standards.

The rule that prevents recertification for helmets after 10 years is set by NAERA, the National Athletic Equipment Reconditioners Association. NOCSAE does not participate in the management or administration of NAERA and does not direct or control NAERA policies.

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Lacrosse

How are lacrosse helmets and face masks tested?

Impact by the ball and stick, as well as collision with other players and turf are the hazards which must be guarded against in this sport. Consequently, the helmet is mounted on the appropriate size head model and is subjected to one drop test from 60 inches onto six specified locations plus a random location, at ambient temperature. The side of the helmet is also subjected to a single 60-inch drop immediately after being

stored for four hours at 120 degrees F. The front, side, rear and two random locations are struck by the ball at 70 mph at ambient temperature, and the side is struck by the ball at 60 mph, after being stored for four hours at 120 degrees F. Shock measurements are taken by a triaxial accelerometer mounted at the center of gravity of the head model to determine if the helmet meets an established Severity Index tolerance. There is a recertification procedure which involves one drop from 48 inches onto two locations, including front and one rotated position, on a sufficient number of randomly chosen helmets, as well as 100 percent inspection of all helmets. This procedure forms the basis for parts replacement and rejection of helmets adequate to ensure that all helmets leaving the plant will meet the Standard. Face masks are subjected to ball and stick penetration and deflection tests at 55 mph and at ambient temperature. Neither the ball, stick nor mask must touch the face. A stick impact test is also conducted at 40 mph after the helmet and face mask have been stored for four hours at 120 degrees F. Recertification of masks is dependent upon inspection of all masks. Masks must not be distorted more than 1/8 inch from a standard form and attaching straps and hardware must be free of distortion, defect or deterioration upon disassembly. Manufacturers certify and reconditioners recertify that helmets meet the respective performance test standards. NOCSAE does not certify, recertify, approve or disapprove helmets or any other athletic equipment.

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What steps can consumers take to ensure lacrosse balls meet NOCSAE standards?

In March 2018, NOCSAE issued a warning for lacrosse players, coaches and teams to use caution when purchasing lacrosse balls online. NOCSAE is taking aggressive steps to stop the sale of counterfeit lacrosse balls by multiple illegitimate vendors, primarily on the Internet, including working with Amazon, GoDaddy and other online shopping platforms to shut down vendors selling lacrosse balls that have not been certified to the NOCSAE standard. Without proper testing and certification to the NOCSAE standard, these counterfeit lacrosse balls could

pose safety risks for players. For example, helmets are tested with balls that meet the standard. Any balls which don't meet the standard could penetrate the face guard, break the shell, or bottom-out the padding if the ball is too hard, too soft, and/or too small.

Consumers should also be aware that many of the counterfeit lacrosse balls appear to have the proper NOCSAE and Safety Equipment Institute (SEI) logos, but the vendors in question are not registered licensees and the balls fail to meet the NOCSAE standard. Consumers should not rely solely on the presence of on-ball marking to assess whether lacrosse balls meet the NOCSAE standard. To ensure these products have been certified to the NOCSAE standard, NOCSAE recommends checking the name of the manufacturer and the ball model against the certified product list available on the SEI website at www.seinet.org.

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Baseball/Softball

Does NOCSAE have a standard for protective headgear for fast pitch softball pitchers?

NOCSAE has a headgear standard for defensive players in baseball and softball, which would include the pitcher. This standard, ND029, specifies equipment that would provide only head protection, or head and facial protection. The standard does not include equipment that provides facial protection only.

The exposure of a defensive player, including the pitcher, to serious injury from a batted ball is greater than the exposure of a base runner. Baseball and softball rules of play, almost unanimously, specify that a baserunner must wear a helmet as a minimum level of protection while running the bases. Some leagues and organizations may also require the addition of a face guard, but none permit a baserunner to wear only facial protection. The NOCSAE standard for baseball and softball defensive players follows the same logic.

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Do cheek flap products meet the NOCSAE standard for face protection?

No. Cheek flap products cannot meet the NOCSAE standard for face protection because they do not protect the eyes, nose and mouth.

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Do new helmet models that include a built-in cheek flap meet the NOCSAE standard for face protection?

No. While newer helmet models that include only a built-in cheek flap do meet the NOCSAE standard for ***head*** protection, they **do not** meet the NOCSAE standard for ***face*** protection.

It's important to note the difference between head protection – the helmet; and face protection –the face guard. When purchasing a helmet with a built-in cheek flap, consumers should understand that the "Meets NOCSAE Standard" logo applies to the NOCSAE standard for ***head*** protection. The cheek flap is not included in that standard and does not meet the NOCSAE standard for ***face*** protection.

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Are products available that meet the NOCSAE standard for face protection?

Yes. Face guard products that meet the NOCSAE standard for face protection are widely available. Currently, 11 different brands sell face guards certified to the NOCSAE standards, not including face guards that are sold as part of a combination helmet/face guard package. The "Meets NOCSAE Standard" logo indicates a face guard meets rigorous safety and quality control criteria and provides protection for the entire face, including the eyes, nose and mouth.

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Why do some youth leagues not allow cheek flaps?

While the policies of youth sports leagues vary with each

organization, add-on helmet accessories are often not allowed because they change the original helmet model. The addition of an add-on product from a third-party manufacturer can void the NOCSAE certification, because it creates a new and untested model, as defined by NOCSAE standards. This policy has been a part of NOCSAE standards for many years, applies to all NOCSAE standards, and is typical of certification procedures for other types of personal protection equipment. See, e.g., NIOSH standards for respirators and the use of after-market modifications.

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Other Sports

Does NOCSAE have a hockey helmet standard?

While NOCSAE offers a standard for hockey helmets, it is not the standard chosen by the Hockey Equipment Certification Council (HECC). NOCSAE published its hockey helmet standard in 2002 after its testing indicated that existing standards didn't require the level of protection NOCSAE's scientific committee would recommend based on the level of injury exposure in the game. Upon completion, NOCSAE shared its research findings and standard with the HECC for its consideration. None of the hockey helmets on the market today are certified to the NOCSAE standard. It's important to note that hockey helmets should not be compared directly to helmets designed for football or any other sport. Variations in frequency and types of exposure must be considered.

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NOCSAE
Protecting athletes since 1970
50 YEARS

National Operating Committee on Standards for Athletic Equipment

About NOCSAE

Mission

The National Operating Committee on Standards for Athletic Equipment (NOCSAE) is an independent and nonprofit standards development body with the sole mission to enhance athletic safety through scientific research and the creation of performance standards for athletic equipment.

Function

Since its inception in 1970, NOCSAE has been a leading force in the effort to improve athletic equipment, and to reduce injuries through robust standards for athletic equipment.

NOCSAE develops voluntary performance and test standards for athletic equipment that are available for adoption by any athletic regulatory body. Numerous national and international regulatory bodies for sports require NOCSAE standards, including the NFL, NCAA, National Federation of State High

School Associations (NFHS), International Federation of American Football, USA Football, US Lacrosse and the United States Department of Defense Education Activity which oversees and regulates military base athletic programs for the children of military families around the world.

For more information, view how we function.

Standards

NOCSAE standards are created, revised and approved by the NOCSAE Standards Committee, which serves as a consensus body in accordance with the American National Standards Institute (ANSI) due process requirements for standards development bodies. The NOCSAE standard is an objective pass/fail standard, not a comparative standard. Interested parties are encouraged to submit comments, suggestions, objections or other responses to any standards under consideration or existing standards.

NOCSAE standards are constantly being updated to reflect the latest science, technology and medicine.

Research

NOCSAE fosters and encourages the dissemination of information on research findings on athletic equipment, injury data, and other closely related areas of inquiry through the organizations represented on the NOCSAE Board of Directors, and other entities in the fields of athletic and sports medicine.

For more than 20 years, NOCSAE has been a leading source for concussion-specific research funding in sports medicine and science. Since 1995, NOCSAE has devoted more than $8 million toward concussion research by the foremost experts in sports medicine and science to develop and advance athlete safety.

NOCSAE research efforts have also led to a better understanding of the mechanism and tolerance of head and neck injuries and more knowledge concerning the design and structure of football helmets, football face masks, batter's and catcher's helmets and lacrosse protective headgear and face masks.

Funding

NOCSAE is an independent, nonprofit 501(c)(3) organization funded primarily through licensing fees it charges to equipment manufacturers that want to have their equipment certified or recertified to NOCSAE standards.

Approximately 75 to 80 percent of all revenue collected from these license fees is reinvested into education and research to advance the science and safety of athletes. Manufacturers and reconditioners are obligated by contract license agreement with NOCSAE to maintain detailed quality control and quality assurance programs which include testing randomly selected helmets during production to make sure they meet the NOCSAE standards.

Consensus Standards Process

The makeup of the NOCSAE Standards Committee is inclusive of all materially affected interests that may be impacted by its standards. NOCSAE invites anyone who may be impacted by a standard to be involved in its development, including those who represent the sports and medical communities, manufacturers,

parents and others. This openness and invitation to participation in the standards development process is intended to comply with ANSI due process guidelines.

The NOCSAE Procedures for Adoption and Implementation of Standards and Revisions to Existing Standards require that a balance of interests always be maintained on the Standards Committee, and these requirements prevent any single interest from dominating the Standards Committee or the development, promulgation, or revision of a standard.

Patents Policy

NOCSAE® adheres to the ANSI Essential Requirements policy for the inclusion of patents in standards. This policy and related procedures and provisions can be viewed at https://www.ansi.org/essentialrequirements/.

A. **Patent**. A patent is a property right granted by the government to inventors of new and useful inventions. Patents may be granted on any new and useful process, machine, manufactured article, composition of matter, or any new and useful improvements thereof. During a patent's limited term, its owner has the right to exclude others from making, using, selling, offering for sale or importing the patented invention into the United States.

From time to time it may become necessary to include a reference or requirement to use a patented process or item in a NOCSAE® standard. When that happens, NOCSAE® does not claim any interest in such patent, and will obtain where possible, permission from the patent holder to reference such process or item in the standard.

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Exhibit C

STANDARD TEST METHOD AND EQUIPMENT USED IN EVALUATING THE PERFORMANCE CHARACTERISTICS OF HEADGEAR/EQUIPMENT

NOCSAE DOC ND 001-17m17b

Prepared By

NOCSAE

NATIONAL OPERATING COMMITTEE
ON STANDARDS FOR ATHLETIC EQUIPMENT

Revised: January 2017
Modified: December 2017
Effective: January 2018

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PREFACE

In an effort to reduce the severity and number of head injuries in certain organized sports, the National Operating Committee on Standards for Athletic Equipment (NOCSAE®)[1] has developed methods and performance requirements for testing protective equipment. It is believed that fewer injuries will be incurred provided the following conditions are met:

a. Manufacturer adherence to the certification of new headgear/equipment utilizing the appropriate NOCSAE standards.

b. Manufacturer implementation of an effective Quality Assurance Program (referred to herein as QA/QC protocols).

c. Consumer adherence to a program of periodically having used headgear inspected and recertified in accordance with the appropriate NOCSAE standards.

d. Recertifiers adherence to the testing of recertified headgear in accordance with the appropriate NOCSAE standards and procedural guides.

e. Recertifier implementation of effective QA/QC protocols.

f. Participation in ongoing Round Robin system verification of all laboratories performing testing to NOCSAE standards.

This standard test method specifies basic performance requirements, methods, and equipment used for testing protective headgear/equipment. Appropriate NOCSAE performance standards (standard specifications) will use these methods and equipment. Impact velocities, pass/fail criteria, and other performance requirements will be specified in appropriate NOCSAE standard specifications, tailored to the needs of a particular activity.

The test methods and performance requirements are based on research initiated in 1971 at Wayne State University, Department of Neurosurgery Biomechanics Laboratory under the direction of Dr. Voight R. Hodgson and later at the Sports Biomechanics Laboratory of the University of Tennessee and continues today in part through grants awarded by NOCSAE. These test methods incorporate many aspects of other recognized headgear performance standards. These test methods draw from work done by others where appropriate for this test method. These standards may be referenced.

NOCSAE recognizes the difficulty of formulating a laboratory standard to reduce head injury in an environment in which the injury incidence is relatively low. Further, many injury mechanisms remain unknown, and no tolerable index is available for hemorrhagic injuries or subdural hematomas that are a primary cause of death and permanent injury in certain organized sports.

[1] The NOCSAE board is comprised of individuals chosen by various national athletic and professional organizations which represent a balance of key stakeholder interests, including public, end-user, medical and scientific, manufacturer, and national governing. These diverse interests have joined forces in an attempt to arrive at a common goal of reducing sports-related injuries. End user and public stakeholders include the American Football Coaches Association, the National Athletic Trainers Association, the Athletic Equipment Managers Association, and the American College Health Association. Medical and scientific stakeholders include The American College of Sports Medicine, American Academy of Pediatrics, American Medical Society for Sports Medicine, and the American Orthopedic Society for Sports Medicine. Manufacturing interests include the Sports Fitness Industry Association, the National Athletic Equipment Reconditioners Association, and one at-large board membership position. Public and national governing body interests include The National Federation of State High School Associations and the National Collegiate Athletic Association.

The NOCSAE drop test method defines impact limits for linear acceleration. The standards are a recommended procedures for headgear/equipment manufacturers and recertifiers, which if followed, should aid in the reduction of future injuries.

Since the testing requirements and certification of manufacturer's models are based on new products, it is recommended that the consumer maintain a Recertification Program.

It is recognized that interested parties should continuously review NOCSAE standards in the light of progress in injury reporting, research and manufacturing techniques and suggestions for improvement. In instances where changes affect any of the following critical test parameters, the effective date of the revised standard will be the time of issuance plus 12 months:

a. Headform characteristics
b. Drop heights/velocities
c. Environmental conditions
d. Anvil and/or impact surface characteristics
e. Severity Index (SI) Limits
f. Pass/Fail Criteria
g. Number of impacts
h. Impact location
i. Instrumentation

Revised NOCSAE Standards must be in writing and the year of revision adopted as the suffix of the Document number. All NOCSAE standards that have not been revised or modified for a period of five (5) years shall be referred to the board for action. The board shall decide to maintain the standard in its current form, revise the standard, or withdraw the standard within one year. Withdrawn standards are not supported and should not be referenced by any governing body.

Minor changes to a NOCSAE Standard are identified as being a "modification." Modifications are to be adhered to at the time of the subsequent issuance of that document. Upon modification, the month and year of the modification is noted on the cover page of the modified document.

NOCSAE publishes standards but does not conduct surveillance to assure compliance to standards. This is the sole responsibility of a third party certification entity per section 6 below.

Manufacturers must be aware that with any mechanical system there are tolerances (i.e. the stem and rotator angles have a ±1º tolerance) that may affect the outcome of the tests. For example, with the tolerance of the stem and rotator taken into account, some random locations may be deemed outside of the impact area in some labs on some helmets while inside the impact area in others. Therefore, it is recommended that manufactures take necessary steps to be certain that products tested with consideration to all tolerances remain in compliance with NOCSAE standards. If an impact location is determined to be within the impact area on a mechanical system that is within the allowable tolerances, then that impact location is considered to be a valid impact site for all NOCSAE systems.

NOCSAE does not approve, disapprove, certify, or recertify athletic equipment of any kind.

1. **Scope**

1.1. This standard test method describes laboratory equipment and basic requirements pertinent to testing headgear/equipment. Deviations, additions, or both, to this test method will be specified as required in the appropriate NOCSAE standard performance specifications. Measurement units shall be those expressed in English units, metric approximate equivalency values are provided as a reference but shall not be the official measure.

1.2. This standard test method is limited to use with products associated with specific NOCSAE standards. The determination of the applicability of NOCSAE standards and the implementation of any aspect of NOCSAE standards including but not limited to test methodology and equivalency shall be determined by the NOCSAE board.

1.3. *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. **Referenced/Historical Documents**

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2.2. ANSI/ASQ Z1.4, *Sampling Procedures and Tables for Inspection by Attributes*.

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2.4. ANSI/ISO/ASQ Q9000 *Quality Management Systems Requirements Standards*: ANSI/ISO/ASQ Q9000, ANSI/ISO/ASQ Q9001, and ANSI/ISO/ASQ Q9004.

2.5. ASTM F1446, *Standard Test Methods for Equipment and Procedures Used in Evaluating the Performance Characteristics of Protective Headgear*.

2.6. ASTM E2234, *Standard Practice for Sampling a Stream of Product by Attributes Indexed by AQL*.

2.7. ASTM E2762, *Standard Practice for Sampling a Stream of Product by Variables Indexed by AQL*.

2.8. Churchill, E., et al., Anthropometry Research Project Yellow Springs, Ohio, December 1971; Anthropometry of the U.S. Army Aviators - 1970; National Technical Information Service; U.S. Department of Commerce; 5285 Port Ridge, Springfield, VA 22151; December 1971.

2.9. Claus. W. D., et al., “Development of Headform for Sizing Infantry Helmets,” Technical Report 75-23 CAMEL Project Ref.LT662713Dj90 Series CEMEL-131; Clothing, Equipment, and Materials Engineering Laboratories, Natwick, MA 01760.

2.10. Farkas, Leslie G. (M.D., C.Sc., D.Sc., FRCS (C) Assoc. Prof., Dept. of Surgery University of Toronto), *Anthropometry of the Head and Face*, 1st Edition, Raven Press, NY

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2.12. Gadd, C.W. (600793), *"Use of a Weighted - Impulse Criterion for Estimating Injury Hazard", Proceedings of the Tenth Stapp Car Crash Conference, November 8-9, 1966. SAE, Incorporated, Two Pennsylvania Plaza, New York, New York 10001.*

2.13. Halstead, D. et al, "*Recommendations for Mechanical Test System Revisions." Technical Report, NOCSAE,1994"*

2.14. ISO 2859, *Sampling Procedures for Inspection by Attributes – Part 1: Sampling Schemes Indexed by Acceptance Quality Limit (AQL) for Lot-by-lot Inspection*.

2.15. ISO 3951, *Sampling Procedures for Inspection by Variables – Part 1: Specification for Single Sampling Plans Indexed by Acceptance Quality Limit (AQL) for Lot-by-lot Inspection for a Single Quality Characteristic and a Single AQL*.

2.16. ISO/IEC 17065 (Effective September 15, 2015, currently ISO Guide 65), *Conformity Assessment – Requirements for Bodies Certifying Products, Processes, and Services*.

2.17. ISO 17011, *Conformity Assessment-General Requirements for Accreditation Bodies Accrediting Conformity Assessment Bodies*

2.18. Military Standard 105, *Sampling Procedures and Tables for Inspection by Attributes*.

2.19. Military Standard 414, *Sampling Procedures and Tables for Inspection by Variables for Percent Defective*, 1957,

2.20. Neubauer, Dean V. (Corning Incorporated) and Luko, Stephen N. (United Technologies Aerospace Systems), *"Comparing Acceptance Sampling Standards, Part 1," Quality Engineering, Vol. 25, 2013, 73-77.*

2.21. Neubauer, Dean V. (Corning Incorporated) and Luko, Stephen N. (United Technologies Aerospace Systems), *"Comparing Acceptance Sampling Standards, Part 2," Quality Engineering, Vol. 25, 2013, 181-187.*

2.22. NOCSAE DOC ND 011, *Manufacturers Procedural Guide for Product Sample Selection for Testing to NOCSAE Standards*.

2.23. NOCSAE DOC ND 015, *Standard Test Method and Specification Used in Evaluating the Corrosion Characteristics and Effects on Metallic Hardware Disassembly.*

2.24. NOCSAE DOC ND 100, *Troubleshooting Guide for Test Equipment and Impact Testing.*

2.25. NOCSAE DOC ND 101, *Equipment Calibration Procedures*.

2.26. Prasad, P. and Mertz, H.J., "*The Position of the United States Delegation to the ISO Working Group 6 on the Use of HIC in the Automotive Environment," SAE Technical Paper 851246, 1985.*

2.27. Roebuck, J.A. Jr, *Anthropometric Methods: Designing To Fit The Human Body – Monographs in Human Factors and Ergonomics*, Human Factors and Ergonomics Society, 1995, ISBN 978-0945289012.

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2.29. Ulijaszek, S.J. and Mascie, C. G. N., "*Anthropometry: The individual and the Population Cambridge Studies in Biological Anthropology," Taylor Department of Biological Anthropology University of Cambridge, Cambridge, UK*

2.30. Additional data used in headform development.

2.30.1. *Anthropometry of the Head, Neck and Face,* MIT Press

2.30.2. SAE publications on Human Anthropometry

2.30.3. Halstead Study Of Facial And Cranial Features In Athletes, 1987 Unpublished

2.30.4. Reicho data is from that individual's ongoing, as yet unpublished, data on eye and face anthropometrics.

3. **Terminology**

3.1. Acceptance Sampling: Acceptance sampling uses statistical probabilities and a relatively small proportion of a production lot (as a sample) to estimate the quality of the entire lot and use this estimate as to the basis to either accept or reject the lot.

3.2. Ambient: Normal laboratory environment, 72° F, ± 5° F (22° C, ± 2° C).

3.3. Acceptable Quality Limit (AQL): The base line requirement for the quality of the manufacturer's product when using a sampling plan.

3.4. Basic Plane (Frankfort Plane): An anatomical plane that includes the superior rims of the auditory meatuses (the upper edges of the external openings of the ears) and the notches of the inferior orbital ridges (the bottom edges of the eye sockets).

3.5. Bill: See visor

3.6. Chin Strap: See Retention System

3.7. Common Substances: Household and other readily available materials that are likely to come in contact with headgear/equipment either intentionally (i.e. attempts to clean or polish) or unintentionally via transfer or proximity to the equipment (Hair treatments, bug spray, lotions, sunscreen, etc.).

3.8. Confidence Level: Confidence is a measure of how certain one is that some hypothesis or prediction is correct or that a chosen course of action is the best. Confidence levels for acceptance sampling plans used to determine compliance with NOCSAE standards shall be based on the producer's risk α. When a sample is presented for testing one can then be α confident that the 'accept/reject' decision is the correct one. For example, an acceptance sampling plan that has been designed

with an α of 5% (a 95% confidence level), provides a 95% chance that a good lot (i.e. one equal to or better than the stipulated AQL) will be correctly accepted, and a 5% (100% - 95%) chance that a good lot will be incorrectly rejected. Confidence levels for inspection plans prescribed by MIL-STD-105 and MIL-STD-414 range from around 91% for small lots to 99% for large ones. The level of protection increases with increasing lot size in recognition of the comparatively high cost of rejecting large versus small production lots. Using these plans one can be (1 - α) confident that all lots that should be accepted will be accepted. The corollary to this is that α percentage of good lots will be rejected and erroneously scrapped or subjected to needless rework costs. Confidence level can also be established by in process Statistical Quality plans that demonstrate statistical process capability and levels of control.

3.9. Coronal Plane: An anatomical plane perpendicular to both the basic plane and the midsagittal plane and containing the midpoint of a line connecting the superior rims of the right and left auditory meatuses.

3.10. Crack: A structural discontinuity which cannot support a load normal to its surface without the creation of new surface area.

3.11. Critical Component: Any material, piece, part, or device that is necessary for the product to perform to the requirements of the standard.

3.12. Critical Sizes:

3.12.1. The helmet's "Stetson" size typically denoted as a numeric value that is the circumference divided by pi, i.e. 7¼, that corresponds to the correct headform's "Stetson" size.

3.12.2. The thinnest padding configuration for a particular helmet shell on the largest headform designated for the selling size range for that particular shell.

Note**:** In the event that the largest size of a model is too small to fit the smallest headform, data and conclusions from a substantially similar model may be used to certify the smaller model. In the event the largest size of a model is too large for the largest headform the helmet must still be tested and may be shimmed to approximate proper fit for impact testing.

3.13. Document Naming Convention: Following the document number (NDxxx-YYmZZ) is the year the document was last revised (YY). Revisions require NOCSAE Board approval. The year following the "m" is the year the document was last modified (ZZ or ZZa, etc…). Modifications do not require Board approval. A list of all revisions/modifications is provided at the end of the document.

3.14. Dycal: A dynamic signal generator used to calibrate the Severity Index computation system using only a digital voltmeter.

3.15. Edge: That portion of a headgear's lower perimeter that lies on or below the theoretical lines which define the specified area of impact.

3.16. Eye Protector: A device that may be attached to a headgear and is designed to offer limited protection to the ocular area of the face.

3.17. Face: That portion of the head that is anterior to a plane paralleling the Coronal plane; said plane bisects the posterior most portion of the external canthus.

3.18. Faceguard: Headgear that when correctly fitted to a helmet is designed to offer protection to that portion of the wearer's face, not covered by the helmet, which is covered by the faceguard as worn. Also known as the face protector.

3.19. Failures: If the testing program shows that a production lot may contain units that fail the acceptance criteria, as specified in the applicable QA/QC protocols, for compliance with one or more requirements of the standard, no unit in the production lot can bear the certification mark pending the completion of QA/QC protocol-specified remedial actions. If rectification[1] sampling is possible and can identify all noncomplying units in the lot, then such noncomplying units must be destroyed or altered by repair, to the extent necessary to make them conform to the standard. Where rectification sampling is not possible the entire production lot must be scrapped or reworked. In the case of rework, the entire lot must be resubmitted for testing as required by the applicable QC/QA protocols. If any rework results in a new model as defined herein then such new model must be treated as if it were never certified.

3.20. Figure: Illustrations, representations, and/or photographs that are intended as an aid to understanding the test method, performance criteria, or procedures. Figures are not typically definitive and in any case where the written text is or seems in conflict with a figure, the text shall be deemed as the standard.

3.21. Hardware: Any device, arrangement, or component (not otherwise defined) that facilitates an object to become attached to headgear, including those systems that are integral to or apart from any other headgear component.

3.22. Head: That portion of the body that is above the neck and specifically does not include any part of any vertebral bodies (cervical or any other sections of the spine).

3.23. Headform (NOCSAE): An instrumented model human head designed to fit the carriage assembly and possessing a high bio-fidelity.

3.24. Headgear: Any device placed on the head, or attached to any other appliance placed on the head, to provide protection to the head and/or face of the wearer.

3.25. Helmet (See Headgear): A protective device worn on the head in an effort to reduce or minimize injury to that portion of the head which is within the specified area of coverage while participating in various activities where risk of head injury is recognized.

3.26. Impact Area: The area above the basic plane aft of a specified point anterior to the coronal plane and above the reference plane forward of that same point unless otherwise specified in an appropriate NOCSAE standard performance specification.

[1] Rectification inspection is a strategy whereby production lots that have been rejected under attributes inspection are then subjected to 100% screening inspection during which all defective items found in the production lot are replaced with non-defective ones.

3.27. Intact: The component or system is considered intact if it can withstand a repeat test at the same magnitude and location that raised the question as to whether the component or system remained intact. The repeat test must render results that meet the standard requirements in all aspects. Intact does not mean undamaged or unblemished but does mean ready to perform the intended function of the component or system in question.

3.28. Legible: May be easily read at a distance of not less than 18 inches by an individual with 20/20 corrected vision.

3.29. Level 3: A class of protective equipment for which a functional failure presents a risk of grave and irreversible injury or death. Examples of Level 3 equipment may include, but are not limited to, headgear, projectiles, eye protectors, and chest protectors.

3.30. Level 2: A class of protective equipment for which a functional failure presents a risk of serious injury, but not grave and irreversible injury or death. Examples of Level 2 equipment may include, but are not limited to, shin guards.

3.31. Level 1: A class of equipment for which safety is not the primary function, and where non-conformance to the applicable standard presents no risk of personal injury. Examples of Level 1 equipment may include, but are not limited to, certain types of football hand coverings designed to aid in handling/catching the ball.

3.32. Modular Elastomer Programmer (MEP): A cylindrical shaped pad used as the impact surface.

3.33. Metallic Hardware: Any device, arrangement, or component (not otherwise defined) made of metal that facilitates an object to become attached to headgear such that its emergent removal may be necessary to facilitate access to an injured wearer. Examples are metal bolts, t-nuts, washers, snaps, and other fasteners.

3.34. Midsagittal (Median) Plane: An anatomical plane perpendicular to the basic plane and containing the midpoint of the line connecting the notches of the right and left inferior orbital ridges, and the midpoint of the line connecting the superior rims of the right and left auditory meatus.

3.35. Model: A family or design of headgear/equipment typically available in more than one size that is intended to be identical in every way, except for size. While it may be substantially similar to some other model, it is not intended to be identical to it. Component parts must be the same except for geometries needed to create different sizes. Energy management systems must be of the same materials and construction. Graphical treatments and colors may be variable. If only available in one size or size range, the design must be unique in some respect and therefore is not part of some other family or design (model). Any changes to the model other than size, graphics, or color create a new model, which must have a unique model designation.

3.36. Neck Strap: See Retention System

3.37. Nose Gauge: A device used to determine that a helmet is consistently positioned on the test headform with respect to the headform's nose.

3.38. Permanent (Component): A product component that is not intended to be removed or replaced.

3.39. Permanent (Label/Marking): A label, or similar marking, that cannot be readily: (1) removed without leaving a trace of its previous existence, (2) erased, or (3) smudged to the point that it is illegible. If it ***requires*** chemical or mechanical means such as the use of solvents, abrasives, grinding, etc., to remove a label or marking, then that label or marking is acceptable.

3.40. Primary Retention: See Retention System

3.41. Procedural Guide: A document that provides guidance to accepted laboratory/quality control practices that is used in conjunction with NOCSAE test methods and/or performance specifications. Where appropriate, NOCSAE provides recommended procedural guides. Licensees and others who choose not to utilize the provided guide shall recognize that the provided guide establishes a benchmark upon which any substituted guide may be measured.

3.42. Production Lot: A production lot is a collection of units that is manufactured during a period in which there is no change in parts/materials, suppliers of parts/materials, or production methods within that lot. Units in a production lot are usually, though not necessarily, produced in one continuous production run involving one set-up. The manufacturer shall establish a new production lot when: (1) a change occurs during a production run that could affect the homogeneity of future production, or (2) when units of different lots are mixed thus creating the possibility that units produced after the change may have a different ability to comply with the requirements of the standard.

3.43. Reference Plane: A plane marked on the headforms at a specified distance above and parallel to the basic plane.

Note: See Table 1 and Figure 1 for other anatomical reference points on NOCSAE headforms.

3.44. Retention System: The complete assembly that secures the helmet in a stable position on the wearer's head.

3.44.1. Chin Strap: A component of the helmet retention system which, when properly adjusted, rests on or encompasses the anterior and inferior most portions of the user's face.

3.44.2. Neck Strap: A component of the helmet retention system which, when properly adjusted, rests beneath the user's mandible.

3.44.3. Primary Retention: If the helmet is equipped with both a chinstrap and a neck strap, the neck strap is the component to be tested.

3.45. Severity Index: A measure of the severity of impact with respect to the instantaneous acceleration experienced by the headform as it is impacted. Acceptable Severity Index (SI) levels measured during impact cannot exceed the limit specified in the appropriate NOCSAE standard performance specification.
The Severity Index is defined as:

$$SI = \int_0^T A^{2.5}\, dt$$

Where: A is the instantaneous resultant acceleration expressed as a multiple of g (acceleration of gravity), dt is the time increment in seconds, and the integration is carried out over the essential duration (T) of the acceleration pulse.

For purposes of electronic data gathering, the integration as called for in this formula must begin after the system triggers but before the initial signal rises above 4 g's. The integration must then end when the signal falls below 4 g's, after it has peaked.

3.46. Shell: The exterior casing of a helmet. Normally the rigid structural component of a helmet.

3.47. Shimming: Refers only to the situation were a critical size is too large for the largest headform. A helmet that is too large can be shimmed to approximate fit so long as the shim material is of a mechanical property of low density and compression when compared to the primary energy management system used in the helmet. Shims must be placed in such a way that no part of the shim material is involved in the direct, initial impact. The helmet shall be shimmed so that the impacted area is fit to the head as intended for that area if the helmet were a proper fit to the headform. Additional time of up to three extra minutes shall be allowed for the onset of testing for conditioned samples to facilitate shim placement.

3.48. Signal Conditioner: A module of the Severity Index computation system that conditions the input for the Vector Analyzer and Severity Index computation system. It will excite and condition the signals from a triaxial accelerometer of a specific type, or accept ±5 volts of maximum input directly.

3.49. Signal Word: A particular word or symbol on some types of labels that is meant to draw the attention of, and has meaning to, the reader and/or user of the product to which the label is affixed, or calls attention to that label. Examples would be words like **WARNING, DANGER, CAUTION, STOP,** or the like.

3.50. Similar Model: Refers only to the situation that prevents a small size helmet from being tested because it is too small for the smallest headform and there is no larger size of the same model available for testing. Similar model shall mean a model that, except for size, has geometry substantially the same as a larger tested size and has an energy management system that is of the same density, compression resistance, and thickness tolerances as on the larger size tested model. If the parameters stated above are not the appropriate measures for a particular type of energy management system, it shall be incumbent on the manufacturer to prove the energy management system on the similar model is the same in function as the larger tested model. Any fitting system and the retention system must also be substantially the same as the larger tested model. If there is not a testable size of a larger model that is substantially similar to the smaller model, the smaller un-testable helmet model may not be certified and shall not bear the NOCSAE seal/logo.

3.51. Statistical Process Control (SPC): SPC is a method of in-process quality control that uses statistical tools to monitor and control production processes with the aim of building quality into a product at the point of manufacture.

3.52. Testing Program: Part of a quality control system developed by the manufacturer that demonstrates compliance with requirements of all applicable NOCSAE standards.

3.53. Triaxial Accelerometer: A small piezoelectric acceleration transducer with three (3) axes, designed specifically for vibration measurement in three (3) orthogonal axes.

The accelerometer must be mounted at the center of gravity of the test headform with a sensitive axis aligned to within 5 degrees of the vertical when the headform is in the top impact position. The acceleration data channel complies with the SAE Recommended Practice J211a JUN 80-channel class 1000 filter with the cutoff at 1000 Hz (a low pass filter having a 4-pole Butterworth transfer function and a corner frequency of 1000 Hz meets this requirement). Digital filtering at 1000 Hz can be substituted. (Note: Some other helmet test systems specify the same class filter with a 1650 Hz roll off)

3.54. Visor: An extension of the shell that may be an added component or an integral portion of the shell that extends forward from the front surface in such a way so as to shield the wearer's eyes from the sun. The visor may have attachment points for face protection mounting. The visor is limited to that part of the device that is not in contact with the shell. If the visor is an integral portion of the shell (i.e., shell and visor is molded as one piece), then the visor is that portion that extends into space outward from the helmet's edge.

4. Significance and Use

4.1. The purpose of this test method is to provide reliable and repeatable measurements for the evaluation of various types of protective equipment. This test method is based primarily on attributes (pass/fail criteria) and provides the opportunity to capture variables (measurement data) for statistical analyses. A passing unit of equipment is able to withstand the impact at an acceptable SI and meets all other requirements of the Performance Specifications when tested in accordance with the test method. In order to certify a model as compliant with NOCSAE standards, all sizes of that model that are required to be tested shall be compliant with the appropriate specifications and must meet all aspects of the standard.

4.2. This test method must be used in conjunction with the specific appropriate NOCSAE standard performance specifications relative to a specific activity.

5. Summary of Test Method

5.1. A headgear is positioned on a headform and then dropped in order to achieve an accepted free fall velocity. At impact, the instantaneous acceleration is measured by the triaxial accelerometers and the resultant acceleration shall be used for Severity Index calculation.

5.2. The impact velocities specified in the appropriate NOCSAE performance standards for impact testing shall be measured during the last 1.5 in. (40 mm) of free fall for each test. The measured velocities shall be within the limits specified in the appropriate NOCSAE performance standards.

5.3. If an impact that exceeds the specified velocity range results in a test exceeding the performance criterion, the testing for the sample shall be declared inconclusive and must be repeated.

5.4. The impact velocities specified in the individual performance standards are based on specific velocities and not drop heights. Typical velocity measurement systems record the average velocity of the drop system for a distance just prior to impact which may introduce over a 1% difference from the actual velocity (higher velocities will have less error than lower velocities). To attain the proper velocity for an impact, it is likely that the drop height will need to be adjusted to compensate for both friction

and velocity measurement error. If height adjustments made to attain the proper velocity for an impact account for more than 10% of the total drop height the drop system should be evaluated for repair.

6. Certification

6.1. Certification Expiration:

6.1.1. Helmets intended to be recertified shall have a recertification interval provided by the manufacturer. Certification life is limited to this time period. Helmets not recertified during the stated interval shall no longer be certified. Recertification interval required for warranty validation shall satisfy this requirement.

6.1.2. Helmets that are not to be recertified, as mandated by the manufacturer shall have a certification expiration.

6.2. NOCSAE publishes standards but does not conduct routine surveillance to assure compliance. Historically, the certification of compliance with the standard has been the responsibility of the manufacturer of the product that carries the NOCSAE seal/logo. During 2015, NOCSAE began implementing a requirement that certification of compliance with a NOCSAE standard shall be made by an American National Standards Institute (ANSI) accredited product certification body selected by NOCSAE. Currently, NOCSAE has selected the Safety Equipment Institute (SEI) Inc. as the certification body, consistent with the requirements set forth below. All newly manufactured equipment certified as compliant with the NOCSAE standard will indicate "SEI certified MEETS NOCSAE Standard" along with the appropriate seal/logo. The certification organization shall not be owned or controlled by manufacturers or vendors of the product being certified.

6.2.1. The certification body shall be primarily engaged in certification work and shall not have monetary interest in the product’s ultimate profitability.

6.2.2. The certification body shall be accredited by ANSI for the scope of personal protective equipment in accordance with ISO Guide 65 (after September 15, 2015, ISO/IEC 17065). The accreditation shall be issued by an accreditation body operating in accordance with ISO 17011.

6.3. The certification body shall have a surveillance program, which includes initial and annual testing and quality audits, to ensure the NOCSAE licensee and manufacturing facilities of the certified product has a quality system in place that meets the requirements of this standard. The certification body shall not allow a reduction in QC/QA protocols as specified in this standard. Annual surveillance audits shall be conducted. During annual surveillance audits samples shall be selected for annual certification testing. Where a remote audit is conducted, samples for annual certification testing will be selected from the open market or submitted by the manufacturer in accordance with the Certifying Bodies’ procedures.

6.3.1. Licensees whose products fall into Equipment Levels 2 and 3 shall, at a minimum, undergo an onsite audit upon initial participation in the certification program. Upon certification, annual surveillance audits shall be required with an onsite audit at least every three years. Audits in years two and three following an onsite audit may be accomplished by remote surveillance audits if all of the following is true:

1. There were no critical testing non-compliances during annual certification testing.

2. The initial onsite audit showed no major non-conformities as defined by the certification entity.

3. There were no new model categories (e.g. new products certified to standards not utilized during initial audit) presented during the non-onsite audit years.

4. The equipment being certified has at least three years of QA/QC data available for review through an annual remote audit.

If any of the above criteria are not met, remote surveillance audits shall not be permitted.

6.3.2. Licensees whose products fall into Equipment Level 1, shall undergo a remote audit upon initial participation in the certification program and annually thereafter. However, an onsite surveillance audit may be conducted in the event the remote audit is unsatisfactory or there are multiple testing non-compliances during annual certification testing.

6.4. Firms that manufacture certified products shall conduct a testing program and shall include ongoing QC/QA protocols to effectively control the quality and performance of all products that bear the NOCSAE seal/logo/compliance language. The QC/QA protocols shall include testing programs that will provide documentary evidence that the certified products produced, and released for shipment to their respective markets, are in compliance (as defined below in Section 6.4.1) with all applicable NOCSAE standards.

6.4.1. Products will be considered to be in compliance when the following criteria are satisfied and supported by statistical analyses of applicable test results.

6.4.1.1. Level 3 Equipment: Manufacturers shall demonstrate a statistical process capability of at least three standard deviations in cases where statistical control can be documented and four standard deviations in cases where control either cannot be established or cannot be documented. This requirement can be demonstrated for example with a capability analysis as described in Section 5.3 of NOCSAE DOC ND 011. When manufacturers rely on Acceptance Sampling procedures, an Acceptable Quality Level (AQL) equal to or more demanding than 0.65 shall be used. Individual performance requirements may exempt a particular requirement from Level 3 and assign a lower level of compliance.

6.4.1.2. Any level other than 3 Equipment: Manufacturers shall demonstrate a statistical process capability of at least 1.5 standard deviations in cases where statistical control can be documented and 2 standard deviations in cases where control either cannot be established or cannot be documented. This requirement can be demonstrated for example with a capability analysis as described in Section 5.3 of

NOCSAE DOC ND 011. When manufacturers rely on Acceptance Sampling procedures, an Acceptable Quality Level (AQL) equal to or more demanding than 2.5 shall be used. Individual performance requirements may specify a different level of compliance for specific criteria.

6.5. Test reports shall comply with the test report requirements of section 14.

6.6. A model/product cannot be certified until each available size of that model/product has passed all tests and met all requirements.

7. Construction

7.1. General: Headgear is worn on the head in an effort to reduce or minimize injury to that portion of the head which is within the specified area of coverage, and shall be constructed to reduce the risk of injury to the wearer's head, and to remain on the wearer's head, during impact. Optional devices fitted to the headgear/equipment shall be designed so that they are unlikely to cause injury during use. For example: wire face protectors must not be designed with weld junctions and/or wire terminus ends in the ocular area, such that in the event of a weld separation, the wire ends could come into contact with the ocular area.

7.2. The headgear/equipment must survive all test protocols substantially intact and ready for use.

7.3. Projections: Any internal rigid projections that may contact the wearer's head during impact shall be covered to reduce the likelihood of injury. Pressure sensitive film or electronic methods may employed to evaluate the transmitted force of internal projections suspected to be a likely source of injury, such forces shall be limited to a maximum of 750 lbs/in^2.

7.4. Metallic Hardware shall meet the requirements of ND015, *Standard Test Method and Specification Used in Evaluating the Corrosion Characteristics and Effects on Metallic Hardware Disassembly.*

8. Materials

8.1. Materials used in the headgear/equipment should be durable and resistant to exposure to sun, rain, cold, dust, vibration, perspiration, and products likely to be applied to the skin or hair. If hydrocarbons, cleaning fluids, paints or transfers/decals or other additions may affect the equipment adversely, a warning shall be provided.

9. Labeling & Instructions

9.1. Each headgear/equipment shall be permanently and legibly labeled or marked in a manner such that the following information can be easily read and is not obscured in any manner.

9.1.1. Name of Manufacturer

9.1.2. Model Designation

9.1.3. Size

9.2. Each headgear/equipment shall be permanently and legibly labeled or marked in a manner such that the following additional information can be easily read without removing any permanent component. The following labels shall contain a signal word which shall not be obscured in any manner:

9.2.1. A label that warns the user that no headgear can protect against all possible impacts and the headgear/equipment must be fitted and attached properly to the wearer's head in accordance with the manufacturer's fitting instructions.

9.2.2. A label that warns the user that the headgear/equipment can be damaged by accidental, incidental, or intentional contact with common substances (for example, certain solvents, cleaners, hair treatments, etc.) and that this damage may or may not be visible to the user. This label should also list any recommended cleaning agents or procedures, or both.

9.2.3. Warnings: Each headgear/equipment shall have appropriate warning information as called for in the appropriate NOCSAE performance specifications.

9.3. The appropriate NOCSAE standard performance specifications may require additional labeling or marking on the interior or exterior of the product, or both.

9.4. A permanent and legible label or mark that denotes the month and year of manufacture that can be easily read without removing any permanent component. If this mark or label requires a “code” to determine month and year, such code shall be made available upon request.

9.4.1. A label that denotes the first intended season of use may be used.

9.5. Headgear that are not to be recertified as mandated by the manufacturer shall bear a permanent and legible warning on the exterior of the headgear stating the following:

1. This headgear shall not be recertified.
2. The life of certification, which shall be no longer than 5 years from the date of manufacture.

9.6. Manufacturers of headgear intended to be recertified shall make available the information required in 6.1.1.

9.7. Each headgear/equipment shall have fitting/positioning instructions provided. Including any attachment instructions for authorized accessories, where applicable.

9.8. Warning and other informational requirements, unless in quotations, need not contain the exact wording but must effectively communicate to the end user the required information using the same or similar language. Except where in quotes the language provided in the standards is exemplary only.

9.9. A legible, permanent replica of one of the appropriate NOCSAE seals/logos (see Appendix 3) shall appear on the exterior of the headgear/equipment, see note below seals/logos. High quality files of the seals/logos are available from NOCSAE.

9.10. Packaging for products that have been certified to meet the NOCSAE standard may

include a legible replica of the following seal/logo;

Replicas of NOCSAE seals/logos that appear on the products that SEI has certified to meet the NOCSAE standard are to be placed only on the appropriate products as specified in appropriate NOCSAE standards

10. **Samples for Testing**

10.1. Headgear/equipment shall be tested complete, in the condition as offered for sale or use unless specified otherwise in an appropriate NOCSAE performance specification.

10.2. Headgear/equipment used for testing must be selected in a random manner.

11. **Sample Determination**

11.1. Conformance to NOCSAE standards requires sufficient sampling and testing for statistical analysis.

12. **Conditioning Environments**

12.1. Ambient Temperature: Expose headgear/equipment to testing environment for a minimum of four hours.

12.2. High Temperature: Expose headgear/equipment to conditioned temperature of 115 ± 5 F° (46 ± 3 C°) for a minimum of four hours and a maximum of twenty-four (24) hours.

12.3. Testing Environment: The tests must be performed in an environment with a temperature of 72 F°, ± 5 F° (22 C°, ± 2 C°). Always monitor laboratory conditions (temperature and humidity) prior to testing and at periodic intervals during testing.

12.4. When performing conditioned environment temperature testing, the first impact shall occur between the 1st and 2nd minute after removing the sample from the conditioning environment. Successive impacts in each location shall occur 75 seconds (± 15 sec) after the preceding impact. If the sample cannot be tested within these time constraints, the sample must be returned to the conditioning environment for a minimum of 3 minutes for each minute the sample was out of the conditioning environment. Conditioning must be complete before testing can resume on that sample.

13. Test Headforms

13.1. This section describes the headforms that must be used to conduct NOCSAE tests. Valid NOCSAE headforms include the acronym NOCSAE and a unique serial number which allows traceability to the headform's original physical properties. Headform performance must be verified prior to each test series.

Physical properties of the NOCSAE headforms to be used in this standard drop test method are given in Table 1 and Figure 1.[1]

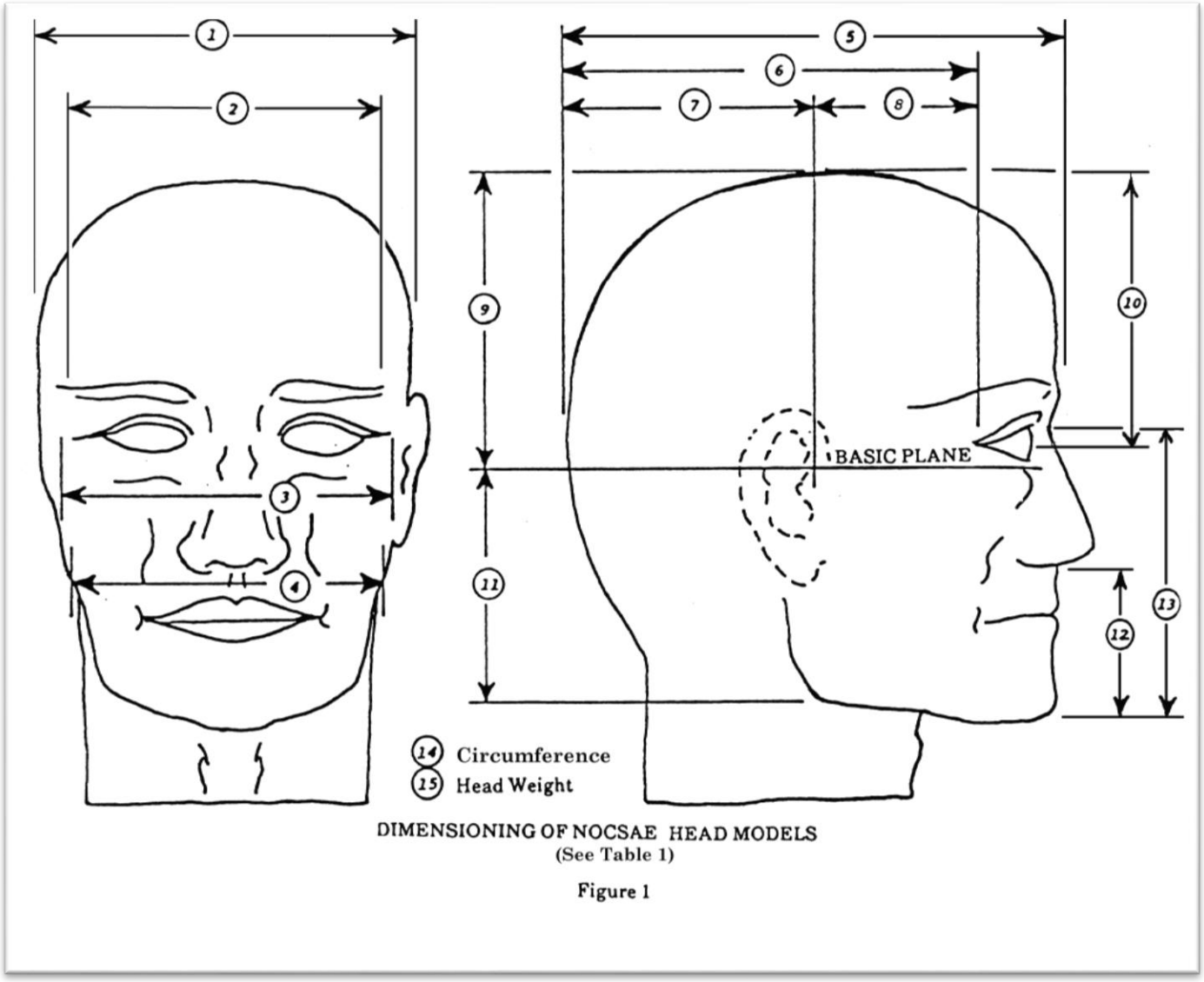
TABLE 1

APPROXIMATE MEASUREMENTS OF NOCSAE HEADFORMS † - inches (mm)
(See Figure 1)

POINTS OF MEASURE	HEADFORM SIZES		
	6 5/8	7 1/4	7 5/8
1 Head Breadth	5.63 (143)	5.98 (152)	6.46 (164)
2 Maximum brow width (frontal diameter)	4.65 (118)	5.20 (132)	5.52 (140)
3 Ear hole to ear hole (bitragion diameter)	5.24 (133)	5.51 (140)	6.06 (154)
4 Maximum jaw width (bigonial diameter)	4.13 (105)	4.65 (118)	5.08 (129)
5 Head length (glabella landmark to back of head)	7.09 (180)	7.87 (200)	8.15 (207)
6 Outside eye corner (external canthus) to back of head	6.22 (158)	6.81 (173)	7.32 (186)
7 Ear hole (tragion) to back of head	3.50 (89)	3.86 (98)	4.25 (108)
8 Ear hole to outside corner of eye (tragion to ext. canthus)	2.72 (69) 4.72 (120)	2.95 (75) 5.24 (133)	3.07 (78) 5.67 (144)
9 Ear hole to top of head (tragion to vertex)	4.13 (105)	4.53 (115)	4.96 (126)
10 Eye pupil to top of head			
11 Ear hole ‡ to jaw angle (tragion to gonion)	3.31 (84)	3.03 (77)	2.84 (72)
12 Bottom of nose to point of chin (subnasal to menton)	2.56 (65)	2.80 (71)	3.03 (77)
13 Top of nose to point of chin (nasion to menton)	4.45 (113)	4.88 (124)	5.39 (137)
14 Head circumference	21.02 (534)	22.68 (576)	24.17 (614)
15 Head weight including mounting interface	9.08 lb (4.12 kg)	10.8 lb (4.90 kg)	13.08lb (5.93 kg)

† The anthropometric measurements are based upon references 2.3 and 2.4.
‡ The right ear of each headform shall be removed flush with the skin surface.

[1] Headforms are available from Southern Impact Research Center.



DIMENSIONING OF NOCSAE HEAD MODELS
(See Table 1)

Figure 1

Note: The right ear has been removed from the models to facilitate right side head impacts. Models with both ears intact are available for special purposes. Models able to accept a nine-array accelerometer block are available. Details of measurement locations are available from NOCSAE's Technical Director.

14. **Reports/Record Keeping**

14.1. **Lab Reports**: Maintain complete test reports for all testing. The reports must be stored electronically and made available upon request. The test report shall contain the following information:

14.1.1. Date of test

14.1.2. Name and location of the test laboratory.

14.1.3. Name of laboratory technician.

14.1.4. Model and size of each product tested, name of manufacturer, date of manufacture, and condition of submitted samples.

14.1.5. Observed temperatures in each conditioning and testing environment.

14.1.6. Pre and post system check or other validation/supporting data.

14.1.7. Test results incorporating data such as the impact locations, velocity, Severity Index, peak linear acceleration, peak rotational acceleration, and headform size for each impact.

14.1.8. Any and all other data required by this standard or the appropriate NOCSAE standard performance specification as well as any additional data the technician feels would contribute to an understanding of the product's performance.

14.1.9. Storage of test report data must be kept electronically and in a format that is compatible with the Excel spreadsheet program. The spreadsheet must contain all of the data in the same format as described in the appendix. Additional information may be included if desired, provided the additional data does not alter the format required above.

14.2. **Production Records:** NOCSAE Licensees shall maintain detailed records of the sampling plan used, including sample size, how determined, how individual products were selected for testing, and the description of the batch from which the sample was taken as well as any other supporting data necessary to support the sampling plan utilized.

14.2.1. Records must be stored for the useful life of the certified product or a minimum of ten years, whichever is longer. Detailed documentation is required on formal QC/QA protocols, including evidence that the particular quality program and procedures so implemented, must comply with some widely recognized quality standard, such as ISO 9001. The documentation submitted should, at a minimum, include details on the statistical process used for certifying and releasing for shipment individual production lots, the sampling plans utilized, the specified AQLs and inspection levels, the procedures for defining and isolating production lots, and any statistical process control methods in place. Protocols should additionally address what internal procedures are activated in the case of test failures.

14.2.2. Any applicable control chart information and capability analyses, or other supporting documentation that demonstrates compliance to NOCSAE standards shall be available.

14.2.3. In the event of a dispute between a NOCSAE licensee and the certifying body, the determination of the adequacy of any aspect of the certification program shall be made solely by the certifying body in accordance with their procedures and agreements.

14.2.4. Records must be kept electronically in English and be available in a format that is compatible with Microsoft Office.

15. **Impact Test Instruments and Equipment**

Note: This section describes mechanical equipment used to conduct NOCSAE drop tests, it should be noted that alternate equipment if used must be demonstrable as equivalent in every way. In addition to the mechanical test equipment, PC based, or other digital signal processing systems, if used, must be demonstrable as having equivalent performance to the NOCSAE recommended data acquisition equipment parameters.

15.1. Recommended Guide and Carriage Assembly (refer to Figure 2 and Table 2 below)

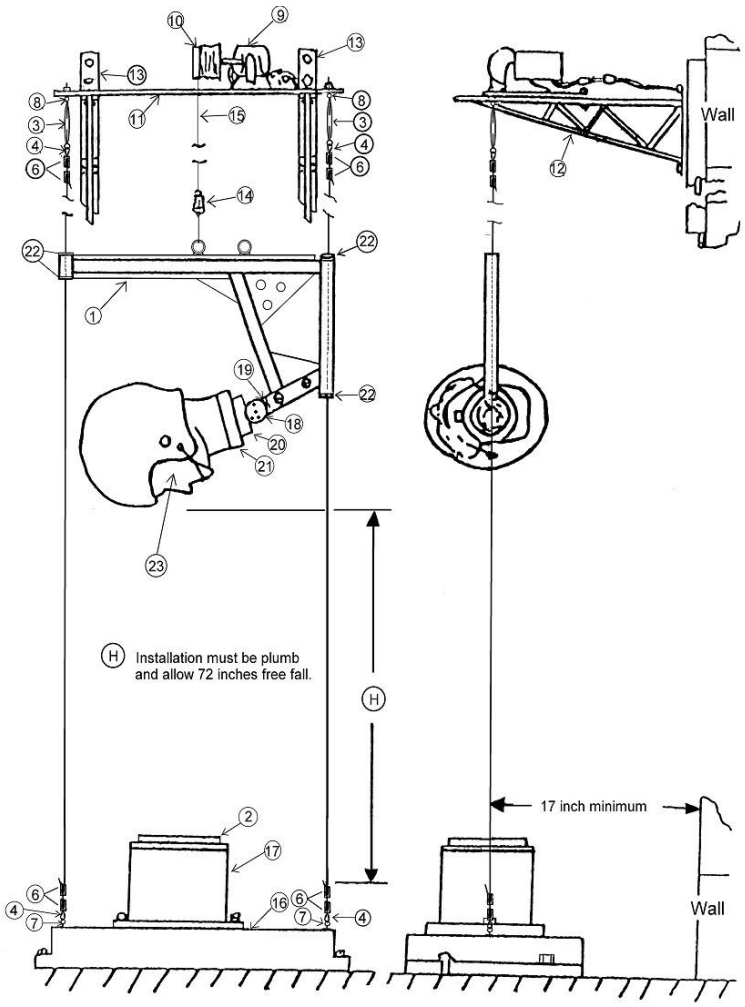


Figure 2

TABLE 2

HEADGEAR DROP TEST MECHANICAL SYSTEM COMPONENTS

CODE	DESCRIPTION	AVAILABILITY [1]	DRAWINGS AVAILABLE	SIRC PART NO.
1	Drop Carriage	SIRC [2]	Yes [3]	1001
2	½" MEP Testing Pad	SIRC	No	1006
2	1/8" MEP Faceguard Testing Pad	SIRC	No	1007
2	3" MEP Calibration Pad	SIRC[4]	No	1005
3	Hook-eye Turnbuckle, Forged Steel, 3/8" with a 6" take-up	SIRC/H [5]	N	1043
4	1/8" Wire Rope Thimble	SIRC/MC [6]	N	1044
5	1/8" Spring Music Wire	SIRC/MC [7]	N	1045
6	1/8" Wire Rope, Tiller Rope Clamp, Bronze	SIRC/MC [8]	N	1046
7	3/8" 16 x 3 " Eye Bolt	SIRC/H	N	1041
8	3/8" Forged Eye Bolt	SIRC/H	N	1040
9	Right Angle DC Hoist Motor	SIRC/G [9]	N	2000
Not Shown	DC Motor Speed Controller (Reversible)	SIRC/G [10]	N	2001
10	Single Groove Sheave (Pulley), 3 ¾"	SIRC/G [11]	N	2002
11	Top Mount Plate	SIRC	Y	2003
12	18" Top Channel Bracket	SIRC/H	N	2004
13	Wall Mount Channel Bracket, 4' x 1 5/8"	SIRC/H	N	2005
14	Mechanical Release System	SIRC	Y	2006
15	Lift Cable, Wire Rope, 20' Coil	SIRC/H	N	2007
16	Anvil Base Plate	SIRC	Y	2010
17	Anvil	SIRC	Y	2011
18	Headform Adjuster	SIRC	Y	2012
19	Headform Rotator Stem	SIRC	Y	2013
20	Headform Threaded Lockring	SIRC	Y	2016
21	Headform Collar	SIRC	y	2014
22	Nylon Bushing	SIRC	Y	1803
23	Small Headform	SIRC[4]	N	1100
23	Medium Headform	SIRC[4]	N	1101
23	Large Headform	SIRC[4]	N	1102

[1]While all of these components are available from SIRC, alternatives are offered.

[2]Southern Impact Research Center (SIRC).

[3]SIRC will make these drawings available for those who would prefer to have this component machined on their own.

[4]Available from Southern Impact Research Center (SIRC).

[5]While this component is available from SIRC, you may also be able to purchase it from a large hardware store.

[6]While this component is available from SIRC, you may also purchase this component from McMaster-Carr Supply.

[7]While this component is available from SIRC, you may also purchase this component from McMaster-Carr Supply.

[8]While this component is available from SIRC, you may also purchase this component from McMaster-Carr Supply.

[9]While this component is available from SIRC, you may also purchase this component from W. W. Grainger, Inc.

[10]While this component is available from SIRC, you may also purchase this component from W. W. Grainger, Inc.

[11]While this component is available from SIRC, you may also purchase this component from W. W. Grainger, Inc.

15.2. Impact Surfaces Specifications (See Appendix 1)

15.2.1. 3” Calibration MEP Pad
Dimensions: Approximately a 3 inch (7.6 cm) thick by 6 inch (15.2 cm)

15.2.2. ½” Test MEP Pad
Dimensions: Approximately a ½ inch (1.3 cm) thick by 6 inch (15.2 cm)

15.2.3. 1/8” Faceguard Test MEP Pad
Dimensions: Approximately a 1/8 inch (3.2 mm) thick by 6 inch (15.2 cm)

15.3. Triaxial Accelerometer: PCB Triaxial Accelerometers, #354MO3, #356A66, or equivalent

15.4. Impact Recording Equipment: The data acquisition systems currently used are, (1) a dedicated KME data analyzer available from K. M. E. Company in Troy, MI or, (2) a standard PC equipped with the appropriate data acquisition components may also be used if equivalence to the NOCSAE recommended equipment (KME data analyzer) is demonstrable.

15.5. Headforms (Physical properties are described in Section 12.)

15.5.1. Small NOCSAE Headform

15.5.2. Medium NOCSAE Headform

15.5.3. Large NOCSAE Headform

16. **Instrument Calibration**

16.1. Verify that the instrumentation used for data acquisition is correctly executing algorithms that will result in appropriate SI levels ± 3% across a range of 300 SI to 2495 SI with a maximum of ± 2% at 1200 SI.

17. **Headform Calibration**

17.1. Each headform must be calibrated prior to testing utilizing an accelerometer, calibration MEP pad, and drop locations/velocities as identified in the NOCSAE Calibration Pad Qualification (or Re-Qualification) Report for the particular MEP Calibration Pad to be used. Velocities specified for headform calibration will have a very narrow tolerance in order to assure valid headform response. Resultant SI for each of the three (3) positions (front, side, top) on each headform must be 1200 SI, ±2%, when headforms are impacted in accordance with the specified velocities. At a minimum, calibration must be performed each time a headform is attached to the drop carriage, an electrical interruption occurs, a mechanical failure of the drop system components occurs, or any component attached to the NOCSAE headform is adjusted (i.e. accelerometer, coupler, collar nuts). Headforms used for testing in non-drop test situations where SI is to be recorded and reported must be calibrated on the drop system and then moved to the other test machinery without removal of the accelerometer from the headform. All data must be collected with the accelerometer/headform combination that was calibrated using the drop system.

17.2. The MEP Calibration Pad shall be requalified at least annually at the laboratory[1] specified by NOCSAE.

18. **System Check**

18.1. A system check must be performed after each calibration and just prior to testing product and the results maintained as part of the certification test data.

18.2. A system check must again be performed upon the completion of a product testing session and the results maintained as part of the certification test data.

18.3. Any variation between 18.1 and 18.2 must be 7% or less.

19. **Impact Attenuation Tests**

19.1. The maximum Severity Index and peak acceleration cannot exceed the limits specified in the appropriate NOCSAE standard performance specification.

19.2. Each headgear/equipment shall be impacted in accordance with the requirements of the appropriate NOCSAE standard performance specification with respect to drop velocities, impact locations, and test conditions.

19.3 The time between successive impacts in each location shall be 75 ± 15 seconds.

19.4 Standard Impact Locations [Medium Headform[2]] (refer to Figure 3 below)

Note: The anvil and the impact surface shall be centered as close as possible to the impact site on the headform. The anvil must be bolted securely to the base plate with both bolts tightened prior to impact.

19.4.1 Front (F): Located in the median plane approximately 1inch above the anterior intersection of the median and reference plane.

19.4.2 Front Boss (FB): A point approximately in the 45 degree plane from the median plane measured clockwise and located approximately above the reference plane.

19.4.3 Side (S): Located approximately at the intersection of the reference and Coronal planes on the right side of the headform.

19.4.4 Rear Boss (RB): A point approximately on the reference plane located approximately 135 degrees clockwise from the anterior intersection of the median and references planes.

19.4.5 Rear (R): Approximately at the posterior intersection of the median and reference planes.

19.4.6 Top (T): Located approximately at the intersection of the median and Coronal planes. The right hand carriage release ring should be used for this drop.

---

[1] Southern Impact Research Center

[2] Impact locations are determined by the carriage, stem and rotator assemblies per established drawings and are approximated on the medium head for reference. Periodic inspection of the components is required to maintain impact location integrity.

19.4.7 Random: Any individual impact location selected from any point within the impact area so that the initial point of contact between the headform and the impact surface shall be on or above the lines that define the impact area as specified in the appropriate NOCSAE performance specification. Random locations must allow rotator assembly to be locked in the position selected within the physical limitations of the impact test equipment defined in Section 14. See Appendix 2 for additional information. A lab conducting a single series of tests per the appropriate performance specification shall use the same random location for each sample of a given size.

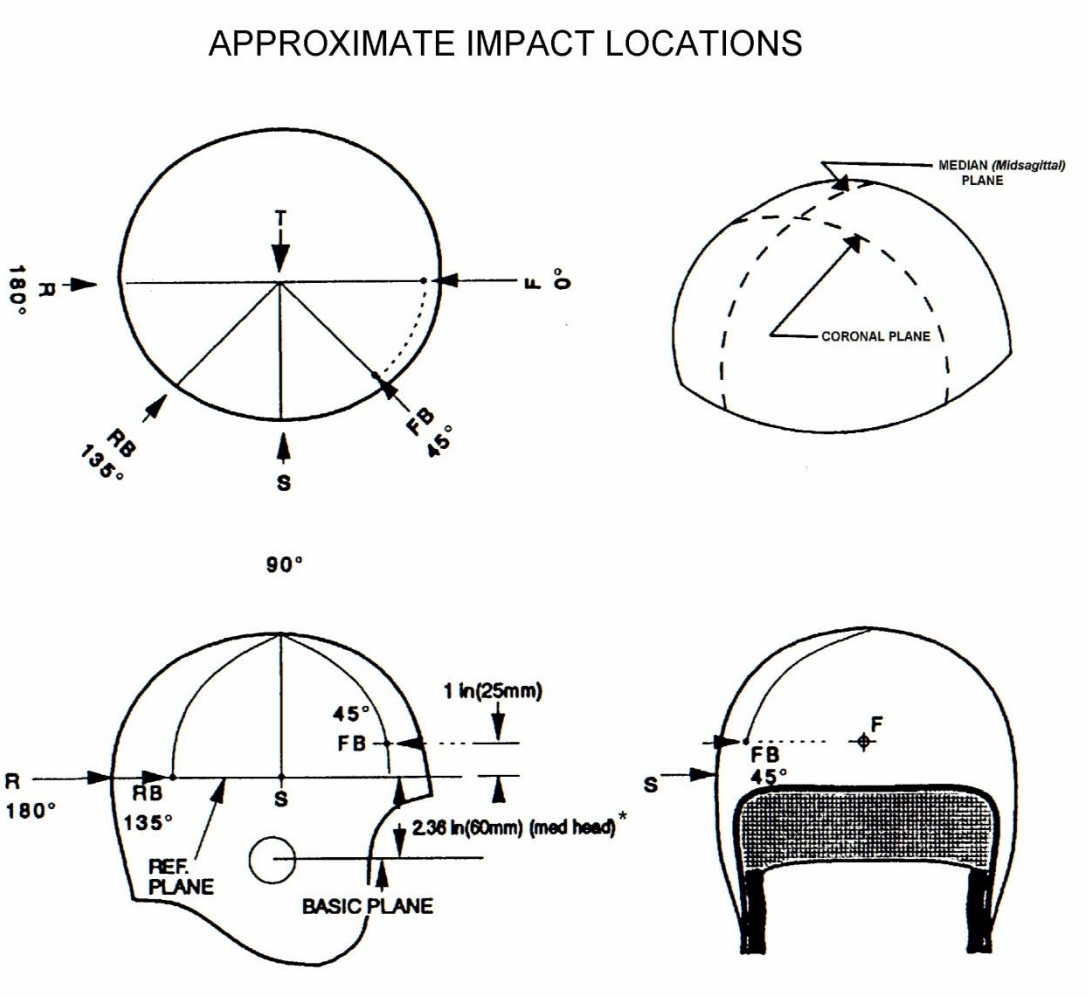


Figure 3

*For the small headform, the REFERENCE PLANE is 2.16 inches above the BASIC PLANE. For the large headform, the REFERENCE PLANE is 2.48 inches above the BASIC PLANE.

The random location may be selected from any point within the allowed impact area. Specific limitations on random impacts, if any, will be specified in the appropriate NOCSAE performance specification for each headgear.

Random locations chosen must allow the rotator assembly to be locked in the position selected.

Impact Area – specified in the appropriate NOCSAE performance specification for each headgear.

20. **Helmet Positioning/Fit**

20.1 Manufacturing fitting instructions shall be used to obtain a reasonable fit on the test headform. In the event that these instructions are unclear or result in a fit that is likely to yield erroneous test results, the technician shall fit the helmet to the best of their ability on the most appropriate test headform.

20.2 The ear holes (if so equipped) of the helmet should be concentric with the headform ear index holes and the lower front rim of the helmet should be aligned with the nose gauge (or the equivalent measurements), using the notch/gauge that is appropriate for the headform in use.

20.3 A manufacturer of a helmet may require a different position by specifying the lower front rim distance from the basic plane as measured vertically from the basic plane on the median plane. If so specified, then that resulting position shall be used instead of the nose gauge position.

Note**:** Since fit is subjective on humanoid headforms, the headform size specified by the manufacturer, or the headform closest to matching the labeled helmet size, should be used as a beginning point. In any case, the resulting fit must be reasonable as determined by the test technician. Where, in the opinion of the technician, the specified headform is incorrect and would yield erroneous test results, the technician **must** substitute a different headform to obtain a better fit.

A measure as to the reasonableness of fit can be conducted as follows: After positioning the helmet as above, with the chin strap and/or other retention straps unfastened, you should be able to smoothly rotate the headform to the inverted (Top) position without any visible motion of the helmet. This is one way to determine if a helmet is too large for a given headform. This method may not be accurate if the helmet has a faceguard attached. If the helmet is too small for a headform, one way to judge this is to measure or observe the distance from the top of the headform to the inside surface of the helmets fitting system. If the top or crown of the headform and the inside of the helmet are not in contact, the helmet is likely too small for that particular headform. In any case, the final decision as to reasonableness of fit rests with the test technician/laboratory.

APPENDIX 1

I. **Specifications**

A. Impact Surfaces:

1. 3” Calibration MEP Pad

a) Dimensions: Approximately a 3 inch (7.6 cm) thick by 6-inch (15.2 cm) diameter pad.

b) Material: Molded from polyurethane thermoplastic elastomer.

c) Performance: Must provide a 232 g response (±40 g’s) when impacted at 5.44 meters/second (± 2%) by a falling impactor having a spheroidal radius of 73 mm (± 1 mm) and a total drop mass of 5 kg (± 5 gm). The carriage and follower assembly cannot exceed 20% of the total drop mass, per ASTM F1446.

d) All new and annually requalified calibration MEP pads shall not require headform drop velocities greater than a 5.5 ft/s (1.68 m/s) deviation from the norm as determined by the requalification lab in any position for any headform size.

e) Additional performance characteristics may be required as deemed appropriate by NOCSAE’s specified re-qualification laboratory.

2. ½” Test MEP Pad

a) Dimensions: Approximately a ½ inch (1.3 cm) thick by 6-inch (15.2 cm) diameter pad.

b) Material: Molded from polyurethane thermoplastic elastomer.

c) Performance: Must provide a 385 g response (± 38 g’s) when impacted at 3.9 meters/second (±2%) by a falling impactor having a spheroidal radius of 73 mm (± 1 mm) and a total drop mass of 5 kg (± 5 gm). The carriage and follower assembly cannot exceed 20% of the total drop mass, per ASTM F 1446.

3. 1/8” Faceguard Test MEP Pad

a) Dimensions: Approximately a 1/8 inch (3.2 mm) thick by 6-inch (15.2 cm) diameter pad.

b) Material: Molded from polyurethane thermoplastic elastomer.

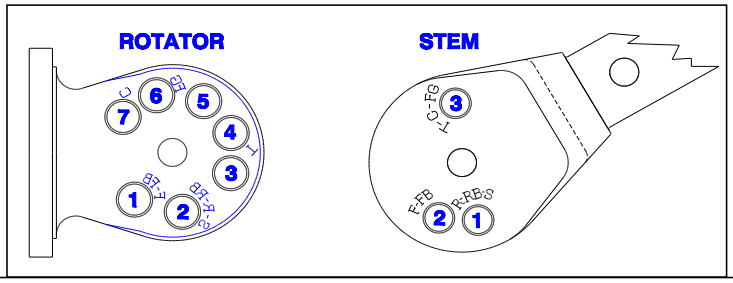
c) Performance: Must have a durometer of greater than 70 Shore “A”.

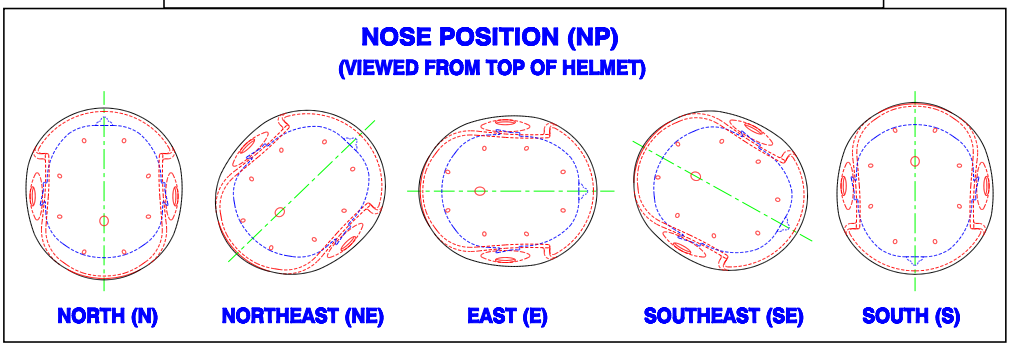
Appendix 2

IMPACT LOCATION GUIDE - NOCSAE TWIN GUIDE WIRE DROP ASSEMBLY

POSITION	ROTATOR	STEM	NOSE POSITION	COMMENTS
1	1	2	SOUTH	NORMAL FRONT POSITION
2	1	2	SOUTHEAST	NORMAL RIGHT FRONT BOSS POSITION
3	2	1	EAST	NORMAL SIDE POSTION
4	2	1	NORTHEAST	NORMAL RIGHT REAR BOSS POSITION
5	2	1	NORTH	NORMAL REAR POSITION
6	4	3	NORTH	NORMAL TOP POSITION
7	4	3	SOUTH	VALID RANDOM POSITION
8	4	3	SOUTHEAST	VALID RANDOM POSITION
9	4	3	EAST	VALID RANDOM POSITION
10	4	3	NORTHEAST	VALID RANDOM POSITION
11	1	1	SOUTH	VALID RANDOM POSITION
12	1	1	SOUTHEAST	VALID RANDOM POSITION
13	1	1	EAST	VALID RANDOM POSITION
14	1	1	NORTHEAST	VALID RANDOM POSITION
15	1	1	NORTH	VALID RANDOM POSITION
16	1	2	NORTH	VALID RANDOM POSITION
17	1	2	NORTHEAST	VALID RANDOM POSITION
18	1	2	EAST	VALID RANDOM POSITION
19	5	3	SOUTH	VALID RANDOM POSITION
20	5	3	SOUTHEAST	VALID RANDOM POSITION
21	5	3	EAST	VALID RANDOM POSITION
22	5	3	NORTHEAST	VALID RANDOM POSITION
23	5	3	NORTH	VALID RANDOM POSITION
24	6	3	NORTHEAST	VALID RANDOM POSITION
25	6	3	NORTH	VALID RANDOM POSITION
26	6	3	EAST	VALID RANDOM POSITION

The above are typically Valid positions, there may be additional valid positions other than the above listed ,due to mechanical tolerances in the system. Like wise there may be listed positions that are not valid on a given test head/helmet/rig.





Appendix 3
NOCSAE Seals/Logos

ND002 Seal/Logo

ND019 Seal/Logo

ND030 Seal/Logo

ND041 Seal/Logo

ND050 Seal/Logo

ND090 Seal/Logo

ND024 Seal/Logo

NOTE: You must have an executed, valid license agreement with NOCSAE and comply with the Safety Equipment Institute's certification program to use any of the NOCSAE seals/logos at any time. NOCSAE, the NOCSAE seals/logos, and the National Operating Committee on Standards for Athletic Equipment are registered marks and the exclusive property of the Committee. Use of the marks in any manner is prohibited without prior written permission of the NOCSAE Board of Directors.

Appendix 3 (continued)
NOCSAE Seals/Logos

ND022 Seal/Logo

ND029 Seal/Logo

ND027 Seal/Logo

ND049 Seal/Logo

ND061 Seal/Logo

ND069 Seal/Logo

NOTE: You must have an executed, valid license agreement with NOCSAE and comply with the Safety Equipment Institute's certification program to use any of the NOCSAE seals/logos at any time. NOCSAE, the NOCSAE seal/logos, and the National Operating Committee on Standards for Athletic Equipment are registered marks and the exclusive property of the Committee. Use of the marks in any manner is prohibited without prior written permission of the NOCSAE Board of Directors.

JANUARY 2015 MODIFICATIONS/REVISIONS

- ***REVISION*:** Added requirement for compliance to ND015, Section 7.4
- Referenced ND015, Section 2
- Added Definition of Metallic Hardware, Section 3
- Added season of use and date requirement in Labels and Warnings section 9.4.1 and 9.5.

APRIL 2015 MODIFICATIONS/REVISIONS

- Updated NOCSAE seal/logo artwork
- Added useful life of certification statement to Section 6 Certification
- Added procedure to evaluate potential risk of injury by internal projections, section 7.3
- Changed reference to 'logo" and/or "seal" to "seal/logo"
- Removed text box on NOCSAE seal/logo artwork, Appendix 3
- Added NOCSAE seal/logo artwork for ND024

JULY 2015 MODIFICATIONS/REVISIONS

- Updated NOCSAE seal/logo artwork

JANUARY 2017 MODIFICATIONS/REVISIONS

- ***REVISION*:** Changed sections 9.4.1, 9.5 and 6.1.2
- Added NOCSAE seal/logo artwork to Appendix 3
- Added peak rotational acceleration to reporting requirements in 14.1.7

FEBRUARY 2017 MODIFICATIONS/REVISIONS

- Combined bullet points 2 and 3 in section 9.5 for clarity.
- Changed section 6.2 from future tense to present tense.

DECEMBER 2017 MODIFICATIONS/REVISIONS

- Added Field Hockey Headgear and Ball NOCSAE seal/logo artwork to Appendix 3.
- Removed material skin disease language.

Exhibit D

STANDARD METHOD OF IMPACT TEST AND PERFORMANCE REQUIREMENTS FOR FOOTBALL FACEGUARDS

NOCSAE DOC ND087-17m17c

Prepared by

NOCSAE

NATIONAL OPERATING COMMITTEE ON
STANDARDS FOR ATHLETIC EQUIPMENT

Revised: January 2017
Modified: July 2017
Effective: January 2018

TABLE OF CONTENTS

1. **Scope**

1.1. This Standard establishes methods of testing and performance requirements for new football faceguards as supplied by manufacturers. The requirements of this standard shall be subject to Level 3 compliance criteria unless otherwise stated herein.

1.2. **All testing and requirements of this standard specification must be in accordance with NOCSAE DOC 001, except where modified herein.**

1.3. *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. **Referenced Documents**

2.1. NOCSAE DOC (ND) 001: *Standard Test Method and Equipment Used in Evaluating the Performance Characteristics of Headgear/Equipment*

3. **Purpose**

3.1. To test new faceguards and attachment system to determine their fit, deflection, strength, suitability of guard and attachment design and materials, and shock absorbent properties, recognition is made that the chinstrap system is part of this system.

4. **Requirements**

4.1. Faceguards must be tested on a helmet that meets the NOCSAE football helmet standard.

4.2. Faceguards must be tested on every helmet model that the faceguard is intended to fit.

5. **Performance**

5.1. When an impact attenuation test is conducted in accordance with section 8, the Severity Index (SI) is defined as:

$$SI = \int_0^T A^{2.5}\, dt$$

Where: A is the instantaneous resultant acceleration expressed as a multiple of g (acceleration of gravity); dt are the time increments in seconds; and the integration is carried out over the essential duration (T) of the acceleration pulse.

5.2. The faceguard shall not contact the face during the 13.89 ft/s drop as determined by carbon paper transfer, electrical contact of any equivalent technique, according to requirements of section 7. Contact with the chinstrap/chin cup shall be a failure, however, if the model passes with the thinnest chinstrap/chin cup offered by the manufacturer for that helmet faceguard combination but makes contact on thicker chinstrap/chin cup options for that helmet faceguard combination that shall not be judged as a failure.

5.3. The faceguard or any of its component attachment parts shall not fail in terms of cracked welds, broken screws, broken T nuts, strap tears or pull-outs, according to requirements of section 8.

5.4. The headgear must meet in addition to the above requirements the following;

5.4.1. 1200 SI shall not be exceeded on any drop.
5.4.2. No structural failure allowed, e.g.: fracture or cracked weld or broken attachment on any drop this includes chin strap systems.

5.5. The standoff measurements for both the nose and chin obtained in Section 8.1.1 shall not exceed 2.75 inches (70 mm).

6. **General**

6.1. Labeling

6.1.1. Each faceguard shall be reasonably permanent and legibly labeled in a manner such that the following information can be easily read.

1. Name of Manufacturer
2. Model
3. Month and Year of Manufacture
4. "SEI Certified, Meets NOCSAE Standard®"

6.1.2. The manufacturer shall make publicly available a list of NOCSAE compliant helmet models on which the faceguard has been tested and certified as meeting this Standard Performance Specification.

NOTE: You must have an executed, valid license agreement with NOCSAE to use any of the NOCSAE logos at any time. NOCSAE, the NOCSAE seals/logos, and the National Operating Committee on Standards for Athletic Equipment are registered marks and the exclusive property of the Committee. Use of the marks in any manner is prohibited without prior written permission of the NOCSAE Board of Directors.

6.2. The choice of materials shall be such as to combine mechanical strength and durability to impact loading over a temperature range from 0°F (-17°C) to 120°F (49°C). And shall be unlikely to fracture, delaminate or become broken, dislodged or separated in a manner that could result in a sharp object presentation that may induce injury.

6.2.1. Materials in mounting systems shall be compatible with one another and shall not be a type known to cause skin irritation or disease. Mounting system materials shall not undergo significant loss of strength or other physical change as a result of contact with perspiration, blood, oil or grease from wearer's hair, or from exposure to ultra-violet rays.

6.2.2. Finishes: All components shall be well finished and free of sharp edges and other irregularities which would present the potential hazards of scratching and cutting the user or an opposing player. Wire or metallic tubular protectors shall have protective coating.

6.2.3. Attachment System: The method of attaching the faceguard to the helmet shall be such as to prevent the faceguard disengaging while under load and in use and in such a way as to minimize static distortion of attachment straps and helmet.

6.2.4. Welded Wire Faceguards: No wire end terminations shall be on the inner surface of the faceguard within the facial cutout of the shell.

6.2.5. All faceguard ends will be terminated with a full radius.

6.2.6. Should the guard's lower perimeter fall completely above the chin measurement location described in section 8.1 at the extents of typical fitting as determined by the technician, then that guard cannot be certified.

7. Reports

7.1. See Section 14, NOCSAE DOC 001.

8. Test Procedures

Before subjecting a faceguard to the test series, prepare it as follows:

8.1. **Helmet Drop Test Positioning**: Attach a new faceguard to any size 7¼ helmet that meets the NOCSAE standard for football headgear for which the guard is designed, using attachment equipment and procedures specified by the manufacturer of the faceguard. Prior to each drop, fit the helmet on the standard medium sized headform such that the ear holes are concentric with the model ear index holes and the front rim is located with the HPI supplied by the manufacturer of the helmet or according to the helmet manufacturer's fitting instructions. The head model and helmet shall be dry to maximize friction. Secure the helmet with the chinstrap and procedure specified by the manufacturer. Measure and record the distance from nose and chin of the model in the midsagittal plane, and the inside surface of the faceguard (standoff distance). The helmet shall be positioned within the extents allowed by the manufacturers fitting instructions so that the standoff measurements can be investigated to ascertain if both nose and chin distances can be adjusted to less than 2 ¾ inches (70 mm) which shall be the position used for impact testing. Note that if the manufacturer supplies a HPI then the measurements shall be made at that position only.

8.1.1. **Measurement Points and Procedure**: The nose and chin points are located on the midsagittal plane on the face of the headform distal from the coronal plane. The nose point is 0.650" below the basic plane on the medium headform; the chin point is located 3.400" below the basic plane on the medium headform. See figure 1 NOCSAE DOC 001. Faceguard standoff measurements will be made parallel to the basic plane to the inside surface of the guard. Should the guard not have a surface on the line projected from the measurement spot toward the faceguard then a surface shall be created using a material that is able to conform to the inside surface of the guard components adjacent to the measurement points in a way that will provide a reference surface at the desired point for the measurement. The thickness of this measurement aid should be as thin as practical and will be accounted for in the measurement so that a very close approximation ± .025" of the true measure of the stand-off distance is obtained. For headforms with an indicator groove molded in to locate the midsagittal plane, measurements may be made from the immediately adjacent surface so as to avoid the measurement probe from engaging the depth of the groove, or the groove may be filled with a material to prevent the probe from entering. In either case the measurement point on the headform must be flush with the surface of the outward edges of the groove.

8.2. **Conditioning**

Immediately prior to the testing sequence, condition the helmet in accordance with the following procedures:

8.2.1. Ambient Conditions: Exposed to 72°F ± 5°F (22.2°C, ± 2.8°C), for at least four hours and a maximum of twenty-four (24) hours.

8.2.2. High Temperature: Exposed to a temperature of 120°F ± 5°F (49°C ± 2.6°C), for at least four hours and a maximum of twenty-four (24) hours.

8.2.3. Low Temperature: Exposed to temperature of 0°F ± 5°F (-17.8°C ± 2.2°C), for at least four hours and a maximum of twenty-four (24) hours.

8.2.4. If during testing, the time out of the conditioning environment exceeds five minutes, return the sample to the conditioning environment for a minimum of three minutes for each minute out of the conditioning environment or four hours, whichever is less, prior to resumption of testing.

8.3. **Test Conditions**

8.3.1. Head Model: Physical properties of the NOCSAE headforms are defined in NOCSAE DO. 001.

8.3.2. Mechanical Test System: A diagram of the helmet drop test system to be used in these tests is defined in NOCSAE DOC 001

8.4. **Impact Attenuation Tests**

8.4.1. Surface: Impact attenuation is measured by determining the head model resultant center of gravity acceleration-time history when the head model/helmet/face guard assembly is dropped in guided free-fall to land with the guard striking a flat, rigid MEP (see appendix in NOCSAE DOC 001 for faceguard MEP specifications)[1].

8.4.2. Drop tests shall be conducted on a separate sample for each of the impact locations, in each of the three temperature conditions, in each of the faceguard sizes offered for sale to fit size 7 ¼ helmets[2]. It is permissible to restore the shape and re-use guards for subsequent tests after completion of a series at any location. If a guard fails a test after such restoration, the test must be repeated using a new sample. Two of each guard in each size must pass each test in order for model certification. Time interval between drops in a single location will be 75 ± 15 sec (this is primarily to allow the helmet to restore its shape and provide a consistent format).

[1] The NOCSAE football drop test anvil with the Standard helmet pad replaced by the faceguard pad, will serve as the impact surface. Elevation by pedestal is necessary to provide clearance for the head model position adjuster for other than front drops.

[2] Large size faceguards shall be tested on helmets, which encompass the 7 ⅜– 7 ⅞ size range, shimmed or pressurized in the rear or side to fit the medium head model.

8.4.3. Faceguards shall be impacted in accordance with Table 1 below and as depicted in Figure 1. All faceguards shall be drop tested at the Front impact location. Only faceguards that meet the requirements of 8.4.4 below shall be impacted at the Bottom impact location.

8.4.4. Bottom Impact Location: Complete the following steps to determine if faceguards require drop tests on the bottom location.

8.4.4.1. Fit the helmet onto the headform as described in section 8.1.

8.4.4.2. Adjust the drop fixture so it is placed in the Bottom Impact Location position. Pin locations for this position are shown in Figure 1.

8.4.4.3. Extend a perpendicular line that originates from the top surface of the MEP. This line shall terminate at the center of the lowest point of the chin of the headform. If the surface that is created by and contained within the perimeter of the faceguard intersects the perpendicular line, the faceguard shall be subjected to Bottom Location impacts.

Table 1
LOCATION[3] – DROP velocities – ft/s (m/s)
(All drop velocities must be within +3% -0%)

	Front	Bottom
72°F ± 5°F (22.2°C ±2.8°C) Drop 1 Drop 2	 13.89 (4.23) 17.94 (5.46)	 13.89 (4.23) 17.94 (5.46)
120°F ± 5°F (49°C ± 2.6°C) Drop 1	 17.94 (5.46)	
0° ± 5°F (-17°C ± 2.0°C) Drop 1	 17.94 (5.46)	

9. Recertification Procedure For Metal Faceguards

9.1. Only those guards which have been previously certified by a manufacturer to have met the NOCSAE Standard may be recertified.

9.2. In the reconditioning process, all faceguards must be removed from the helmet for inspection.

9.2.1. Deformed guards must be discarded. Any bar bent more than 1/8 inch (3.2 mm) from its normal shape at any point constitutes deformation.

9.2.2. Each guard is inspected for weld separation, or other crack, by an appropriate non-destructive test. Any guard found with either type failure shall be discarded.

9.3. For guards to be re-coated the following specifications must be met:

[3] See Figure 1 for picture guides to positions.

9.3.1. The method employed to remove old coating/residue must not compromise the integrity of the guard.

9.3.2. A permanent seal of recertification identifying the re-certifier. The appropriate labels must be affixed in the same location as placed by the original manufacturer.

9.3.3. The guard is to be re-attached to a helmet, in the same manner as the original faceguard manufacturer's instructions.

9.3.4. A statistically relevant sample[4] of remanufactured faceguards must be tested according to NOCSAE Standard certification procedure for football faceguards, to provide assurance that all guards that have undergone the recertification process meet the Standard. This will be limited to ambient temperature drops. One impact at 13.89 ft/s on the front to verify no facial contact and one impact from 17.94 ft/s, in the front location to verify no SI over 1200 and no mechanical failure as outlined above.

9.3.5. If a faceguard contacts the face during the 13.89 ft/s drop, determine if the attachment hardware and attachment locations on the helmet are according to section 8.3.3. If not, correct and repeat the test on a fresh guard. If the guard still contacts the face, do not re-certify any guards of that model until the problem is understood and corrected. The stipulation SI≤1200, must be met in each test, guard models that fail to limit SI to less than 1200 must not be recertified.

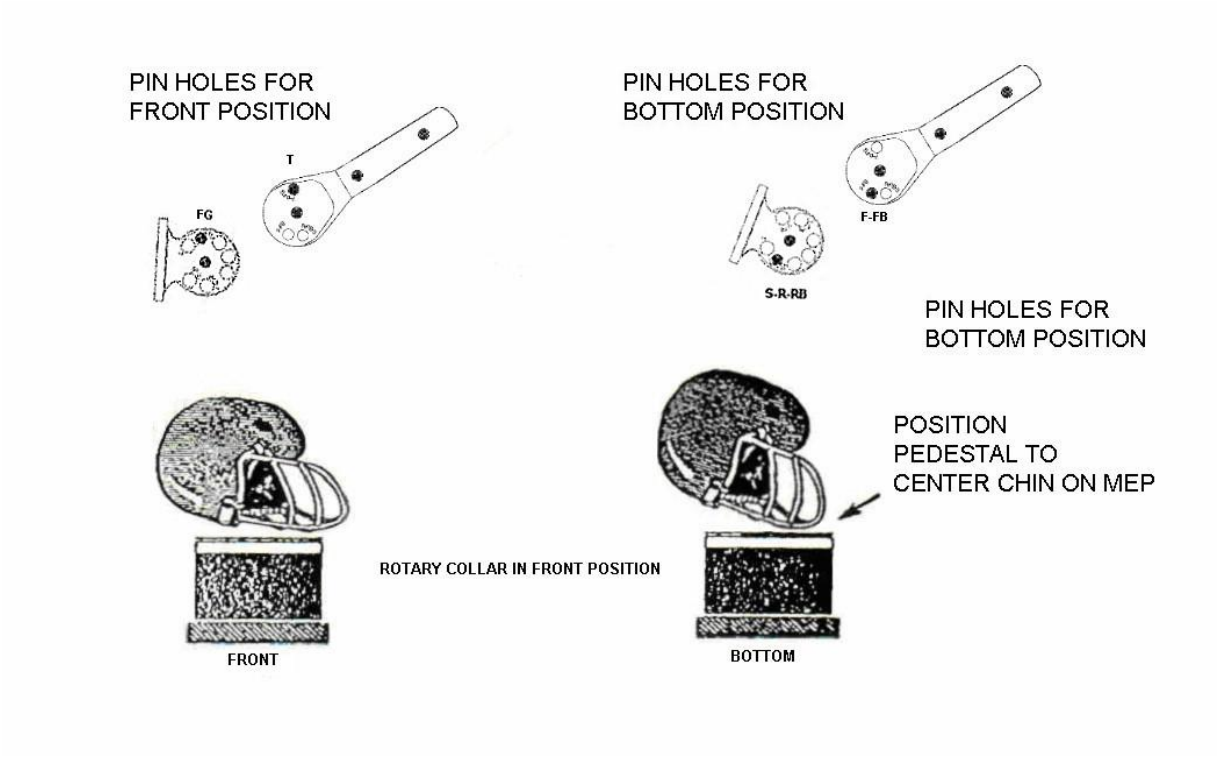


Figure 1

[4] Samples in a sufficient amount in any model so as to insure compliance of all faceguards being reconditioned. Guidance as to how many to test is provided in NOCSAE Doc 001.

JULY 2009 MODIFICATIONS/REVISIONS

- REVISION: Specified that chinstrap and associated hardware are subject to the requirements in section 5
- REVISION: Changed section 7 to clarify faceguard to face measurement procedure.
- Modified sections 8.3.4 and 8.3.5 to clarify SI requirements

DECEMBER 2009 MODIFICATIONS/REVISIONS

- Modified conditioning environments to conform with NOCSAE DOC 001 requirements

MAY 2010 MODIFICATIONS/REVISIONS

- REVISION: Changed bottom impact location. Modified figure 1 to specify pinhole locations. Changed requirements for bottom impact location. Deleted faceguard types.

FEBRUARY 2011 MODIFICATIONS/REVISIONS

- REVISION: Change drop heights to drop velocities. Corrected typos

MAY 2012 MODIFICATIONS/REVISIONS

- REVISION: section 5.2, chin cup contact and section 6.2.6, faceguard coverage requirement
- Added labeling requirement in section 6, for model identification
- Added statements to clarify sections 7.1 and 7.4

SEPTEMBER 2014 MODIFICATIONS/REVISIONS

- Added reference to ND001 for faceguard MEP specifications
- Clarified section 8.3.2
- Corrected typo in section 8.3.5

OCTOBER 2014 MODIFICATIONS/REVISIONS

- Updated document to include level of compliance requirements.
- Added Date specification becomes effective
- Updated title name of NOCSAE DOC. 001
- Added SEI Certification NOCSAE Logo to Section 6.1, “Labeling”

JUNE 2015 MODIFICATIONS/REVISIONS

- Updated NOCSAE seal/logo artwork

JANUARY 2017 MODIFICATIONS/REVISIONS

- REVISION: Increased low temperature conditioning requirement to 0°F from -20°F.
- Clarified 8.4.4 for bottom impact location requirement
- Clarified maximum standoff requirement
- Added section requiring a list of compatible helmets on which faceguard has been tested.

JUNE 2017 MODIFICATIONS/REVISIONS

- Changed the word “specimen” to “sample” in Section 8.4.2.
- Changed the word “model” to “sample” in Section 8.4.2.

JULY 2017 MODIFICATIONS/REVISIONS

- Section 5.3 – Changed reference to section 7 to section 8.

Exhibit E

About SIRC and Our Staff

Media
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Site Map

Scope of Accreditation

Southern Impact Research Center, LLC ("SIRC") is located in Knoxville, Tennessee. SIRC was co-founded by Dave Halstead and Bob Drew in 1995, and is dedicated to reducing injuries, with an emphasis on personal protective equipment such as helmets. Dave Halstead chairs, or serves on several committees with the American Society of Testing & Materials, which have developed standards for bicycle helmets, downhill racing helmets, hockey helmets and other helmets. SIRC is under contract with the National Operating Committee of Standards for Athletic Equipment, and is responsible for technical issues regarding standards development and implementation including test equipment. It is also under contract with the National Football League Players Association, and others to assist and advise as needed in the area of player safety and protection. SIRC developed a state of the art biofidelic and anthropometrically correct human head form (this is the most recent NOCSAE headform a variation of one which was initially developed in the 1970's) to help understand the mechanisms and methods of reducing brain injury. SIRC's laboratory is state of the art, and is accredited by the American Association for Laboratory Accreditation (A2LA) and meets the relevant quality systems requirements of ISO 9001:1994 and ISO 17025 standards for laboratory operations.

The team at SIRC is uniquely qualified in the areas of protective equipment testing and evaluation. Our team members comprise an eclectic and professional organization with a combination of experience, education, innovation and a true desire to understand injury thresholds and how injuries may be reduced. Three of our team members, Dave, Mel and Louise have worked together for nearly 20 years in the area of head injury biomechanics, injury reduction, standards development, quality systems and testing.

We are also active in the education of future scientific minds. Two of SIRC staff are active research scientists in the Industrial & Information Engineering Department at the University of Tennessee, Knoxville. A visit to SIRC will almost always uncover a student or two immersed in some experiment or another. Members of our team and students that have moved on have done so with our assistance and guidance and now maintain key roles in the protective equipment and human injury reduction scientific arena, including Directors and VP's of R & D at some of the worlds largest sporting goods, helmet, and child safety seat manufacturers world wide. Others are active in the academic environment.

A unique biomechanics team approach has led us to the forefront in the understanding of human head injury and the effects that protective interventions such as helmets can have to reduce injury and death.

Click on a team member below to learn more about their backgrounds and interest.

P. David Halstead - Co-Founder/Technical Director

E. Mel Cook - Laboratory Supervisor
Elizabeth McCalley - Research and Development Engineer
Louise Ellenburg - Laboratory Technician
Scott Halstead - Administrative Director

Exhibit F

NOCSAE
Protecting athletes since 1970
50 YEARS
National Operating Committee on Standards for Athletic Equipment

Contact NOCSAE

For further information about NOCSAE, including legal and licensing issues, contact:

For further information regarding the research program, contact:

Research Grants Director

Executive Director / Legal Counsel

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11020 King Street, Suite 215
Overland Park, KS 66210

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NOCSAE
Protecting athletes since 1970
50 YEARS

National Operating Committee on Standards for Athletic Equipment

Recertification

Recertification is the process whereby previously certified helmets and other athletic equipment undergo testing to determine that the equipment continues to meet the original certification requirements. The recertification testing must occur as part of a reconditioning process because the sample helmets randomly selected for testing must be tested both before they are reconditioned and then tested again after they have been reconditioned. Members of the national Athletic Equipment Reconditioners Association ("NAERA") are licensed by NOCSAE to recertify football, lacrosse, softball/baseball helmets, and face guards.

NOCSAE standards include recertification standards for a variety of athletic equipment, including helmets used in football, baseball, softball, ice hockey and lacrosse.

Recertified helmets must have a recertification label that includes the name of the recertifying firm and the year of recertification. This seal may be placed on the interior or exterior of the shell in an area in which it can be easily read without removal of any permanent component and will also contain the following language: "This helmet has been recertified according to procedures established to meet the NOCSAE Standard."

What NOCSAE Recommends and What NOCSAE Requires

Recertification is not a requirement under NOCSAE standards, although it is strongly recommended.

It is NOCSAE's belief that having equipment recertified is the most effective way to make sure that equipment performs as designed and intended.

NOCSAE recommends and encourages any consumer with concerns or questions about their equipment to send in this equipment to a reconditioner for inspection.

New Recertification Requirements for Helmets Became Effective in January 2017.

Since January 2017, NOCSAE standard ND001 has required that the helmet manufacturer specify a recertification frequency in order to maintain the validity of the original new helmet certification.

Helmets not recertified during the stated interval shall no longer be certified. If the manufacturer does not specify a frequency for recertification, then NOCSAE will consider the frequency to be the same as whatever may be required by the manufacturer to maintain its warranty.

Consumers should be aware that manufacturers may choose to prohibit the recertification of a helmet model.

However, NOCSAE standards do mandate that if a manufacturer has obtained certification of compliance with NOCSAE standards for helmets and it prohibits the recertification of a helmet model, it must specify a useful life of the new helmet certification. The date label related to these requirements is to be permanent so there is no confusion as to when the helmet's certification has expired. (See 9.5 under "Labeling and Instructions" in the NOCSAE Standard seen here). The useful life for this certification cannot be more than 5 years.

Helmets Manufactured Before January 2017

If a helmet has been made prior to January 2017, what the manufacturer requires regarding reconditioning and care to maintain warranty can be used as guidance for continued use.

NOCSAE recommends helmets manufactured during this time period should undergo annual testing and when possible, recertification before use.

NAERA will not recondition or recertify helmets 10 years old and older. This is not a NOCSAE requirement and NOCSAE does not participate in the management or administration of NAERA, nor does it direct or control NAERA policies.

If your helmet was manufactured before 2017, or you cannot find any information regarding the recertification or expiration date for your helmet, it is recommended to contact the helmet manufacturer for information about its warranty.

There are currently 18 reconditioners nationally that are licensed by NOCSAE to recertify football, lacrosse, ice hockey, softball and baseball helmets. For more information about recertification and reconditioning, contact: **National Athletic Equipment Reconditioners Association,** http://naera.net/.

(Above) The NOCSAE Football Helmet standard test is performed.

VIEW RECERTIFICATION STANDARDS

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Exhibit H

SEARCH

Benefits

SHOP NOW

Why Guardian Caps?

The Guardian Cap is the leading soft shell helmet cover engineered for impact reduction. It brings a padded, soft-shell layer to the outside of the decades old hard-shell football helmet and reduces impact up to 33%.

SOFT AND PLIABLE:

PADS COMPRESS AT POINT OF IMPACT, REDUCING G-FORCE BY AS MUCH AS 33%.

The Science

Physics say that an outer "soft" material of the proper density, stiffness and energy absorbing properties reduces the initial severity of the impact. The hard shell then has lower forces transmitted to it, and in turn conveys lower forces to the interior soft helmet padding and then lower forces to the head. Very similar to a NASCAR driver and the soft wall technology that tracks have adopted or even automobiles and the soft bumpers and airbags that are now required. The Guardian serves the same purpose for an athlete's head—a soft shell barrier between it and impact.

Background

The Guardian Cap was created in 2010 to address the clear need to advance the standard football helmet, which has changed little since the 1960's. Erin and Lee Hanson, owners of The Hanson Group, utilized their 20+ years in the material science business to engineer, patent, and manufacture the Guardian Cap. Since nothing can prevent or reduce a head injury, what can we do? We realized, we can reduce the impact the head receives when hit. From an engineering perspective, the Guardian Cap is effective because it allows greater energy dissipation at the point of contact with a pl material; the cap is also attached in such a way that allows for shifting and movement

independently of the helmet/head/neck unit, which redirects some of the blow upon contact. From a football perspective, the Guardian Cap is effective because it reduces the overall buildup of small blows that occur in practice.

Testing

Interested in seeing some of our test data? You can email us for all of our testing data, we're happy to share. The Guardian team is always open to more research on the Guardian Cap to further build on the current base of research and continue to bridge the gap that exists between biomechanical testing to the end injuries. Until the gap is bridged, claims will be held only to what has been empirically proven.

Application

- The Guardian Cap is the leading padded helmet cover engineered for impact reduction. It brings a soft-shell layer to the outside of the decades old hard-shell football helmet and reduces impact up to 33%.
- Augments existing helmets to make them pliable and able to more effectively manage energy
- Addresses accumulation of daily sub-concussive blows for OL, DL, LB, TE
- Pads blows to knees, hands, abdomen, etc. during Inside Run and position drills
- Reduces sound and vibrational frequencies; insulates heat in direct sunlight

FOOTBALL

LACROSSE

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3044 Adriatic Court, Peachtree Corners,
GA 30071

770-667-6004

Email Us

CAPS WARNING

No helmet, practice apparatus, or helmet pad can prevent or eliminate the risk of concussions or other serious head injuries while playing sports. Researchers have not reached an agreement on how the results of impact absorption tests relate to concussions. No conclusions about a reduction of risk or severity of concussive injury should be drawn from impact absorption tests.

PEARL WARNING

Lacrosse is a dangerous sport and balls can cause bruises, fractures, or even death upon impact to a player or bystander due to the inherent risks of the game. The user of this product, when used at any velocity, shall abide by the rules of the game of lacrosse. Proper accompanying equipment such as face/eye protectors or helmets must be worn while using this product. Always play by the rules and play smart; if an injury does occur, consult a medical professional before returning to action.

Exhibit I

NOCSAE®

"Commissioning research and establishing standards for athletic equipment, where feasible, and encouraging dissemination of research findings on athletic equipment and sports injuries."

The National Operating Committee on Standards for Athletic Equipment

11020 King Street, Suite 215
Overland Park, KS 66210

913-888-1340 Fax: 913-498-8817
www.nocsae.org

July 16, 2013

NOCSAE statement on third party helmet add-on products and certification

There are many new products on the market that are intended to be added to helmets, in particular football helmets, which products claim to reduce concussions and make helmets safer and more protective. Whether these are additional liners or padding on the inside, or bumpers, pads, coverings or electronic devices that attach to the outside of the helmet, these products were not included in the certification testing and quality control programs that are required for all helmets that are certified to the NOCSAE standards. To address this situation, and to protect the integrity of the NOCSAE standards, the NOCSAE board of directors has adopted the following position:

> "NOCSAE helmet standards are specific to models which are identical in all aspects, except as to size. The testing required to support the certification is also specific to the model being certified. NOCSAE standards require that any change in configuration, padding, shell geometry, or protective system requires a new model designation with separate certification testing. The addition of after-market items by anyone that changes or alters the protective system by adding or deleting protective padding to the inside or outside of the helmet, or which changes or alters the geometry of the shell or adds mass to the helmet, whether temporary or permanent, voids the certification of compliance with the NOCSAE standard."

Exhibit J

NOCSAE®
NEWS

"Commissioning research and establishing standards for athletic equipment, where feasible, and encouraging dissemination of research findings on athletic equipment and sports injuries."
The National Operating Committee on Standards for Athletic Equipment

For Immediate Release:
August 8, 2013

Contact:
Adam Montgomery
314-982-8795
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Certification to NOCSAE Standards and Add-on Helmet Products

OVERLAND PARK, Kansas – August 8, 2013 - The National Operating Committee on Standards for Athletic Equipment (NOCSAE) has released the following statement regarding equipment certified to NOCSAE standards and add-on helmet products.

"Products designed to be added to a football helmet are being marketed and sold; some are intended to measure impacts, while others are expressly marketed as improving a helmet's performance. Some products claim the ability to protect against concussions. Regardless of the truth of such claims, the addition of those products to a certified helmet changes the model, by definition, under the NOCSAE standards.

"For many years NOCSAE standards have defined a helmet model as a helmet "intended to be identical in every way, except for size." Any changes, additions or alterations of the model, except for size, color or graphics, even if made by the original manufacturer, require that a new model name be created and a separate certification testing process begin for that new model. This concept of limiting certification to a specific model is commonly found in national and international helmet standards.

- NOCSAE itself does not certify any product, it does not "approve" or "disapprove" of any product, and has no authority to grant exemptions or waivers to the requirements imposed by the standards it writes.

- The addition of an item(s) to a helmet previously certified without those item(s) creates a new untested model. Whether the add-on product changes the performance or not, the helmet model with the add-on product is no longer "identical in every aspect" to the one originally certified by the manufacturer.

- When this happens, the manufacturer which made the original certification has the right, under the NOCSAE standards, to declare its certification void. It also can decide to engage in additional certification testing of the new model and certify the new model with the add-on product, but it is not required to do so.

- Companies which make add-on products for football helmets have the right to make their own certification of compliance with the NOCSAE standards on a helmet model, but when that is done, the certification and responsibility for the helmet/third-party product combination would become theirs, (not the helmet manufacturer). That certification would be subject to the same obligations applicable to the original helmet manufacturer regarding certification testing, quality control and quality assurance and licensure with NOCSAE.

- Products such as skull caps, headbands, mouth guards, ear inserts or other items that are not attached or incorporated in some way into the helmet are not the types of products that create a new model as defined in the NOCSAE standards and are not items which change the model definition."

NOCSAE®

"Commissioning research and establishing standards for athletic equipment, where feasible, and encouraging dissemination of research findings on athletic equipment and sports injuries."

The National Operating Committee on Standards for Athletic Equipment

About NOCSAE

NOCSAE, the National Operating Committee on Standards for Athletic Equipment, is an independent and nonprofit standard-setting body with the sole mission to enhance athletic safety through scientific research and the creation of performance standards for protective equipment. Formed in 1970, NOCSAE is a leading force in the effort to improve athletic equipment and, as a result, reduce injuries. NOCSAE efforts include the development of performance and test standards for football helmets, gloves and facemasks, baseball and softball batters' and catchers' helmets, baseballs and softballs, ice hockey helmets, soccer shin guards, lacrosse helmets and facemasks and polo helmets. NOCSAE is comprised of a board of directors representing stakeholders from a number of groups – including consumer and end users, equipment manufacturers and reconditioners, athletic trainers, coaches, equipment managers, and academic and sports medicine associations. These diverse interests have joined forces in an attempt to arrive at a common goal of reducing sports-related injuries. NOCSAE is a nonprofit, charitable organization supported by individuals and organizations with an interest in athletics. For more information, please visit www.nocsae.org.

Exhibit K

NOCSAE®

National Operating Committee on Standards for Athletic Equipment

Commissioning research and establishing standards for athletic equipment, where feasible, and encouraging dissemination of research findings on athletic equipment and sports injuries

For Immediate Release

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Certification to NOCSAE Standards and Add-On Helmet Products

OVERLAND PARK, Kan. (May 8, 2018) – The National Operating Committee on Standards for Athletic Equipment (NOCSAE) has released the following statement regarding equipment certified to NOCSAE standards and add-on helmet products.

Products designed to be added to previously certified helmets for baseball, softball, football, lacrosse and other sports are being marketed and sold to consumers. Whether intended to be general improvements or expansions of the helmet's protective coverage or ability, or to collect impact data, the addition of such products to a helmet previously certified as meeting the appropriate NOCSAE® standard will make the certification voidable by the helmet manufacturer. Such additions to the helmet create a new and untested model, as defined in the NOCSAE standards.

For many years NOCSAE standards have defined a helmet model as a helmet "intended to be identical in every way, except for size." Any changes, additions or alterations of the model, except for size or color or graphics, even if made by the original manufacturer, requires that a new model name be created, and a separate certification testing data for that new model. This concept of limiting certification to a specific model is commonly found in national and international helmet standards established by other standards organizations including the U.S. Consumer Product Safety Commission, the U.S. Department of Transportation and the Snell Foundation.

- NOCSAE, itself, does not certify any product, it does not "approve" or "disapprove" of any product, and has no authority to grant exemptions or waivers to the requirements imposed by the standards it writes.

- The addition of an item(s) to a helmet previously certified without the item(s) creates a new untested model. Whether the add-on product improves the performance or not, the helmet model with the add-on product is no longer "identical in every aspect" to the one originally certified by the manufacturer.

- When this happens, the helmet manufacturer has the right, under the NOCSAE standards, to declare its certification void. It may elect to allow the certification to remain unaffected, or it may also decide to engage in additional certification testing of the new model and certify the new model with the add-on product, but it is not required to do so.

- Products such as skull caps, headbands, mouth guards, ear inserts or other items that are not attached or incorporated in some way into the helmet are not the types of products that create a new model as defined in the NOCSAE standards, and are not items which change the model definition.

More information on all NOCSAE standards is available at www.nocsae.org.

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NOCSAE®

National Operating Committee on Standards for Athletic Equipment

Commissioning research and establishing standards for athletic equipment, where feasible, and encouraging dissemination of research findings on athletic equipment and sports injuries

About NOCSAE

NOCSAE, the National Operating Committee on Standards for Athletic Equipment, is an independent and nonprofit standards development body with the mission to enhance athletic safety through scientific research and the creation of performance standards for athletic equipment. Formed in 1969, NOCSAE is a leading force in the effort to improve athletic equipment and, as a result, reduce injuries. NOCSAE efforts include the development of performance and test standards for football helmets, gloves and facemasks, baseball and softball batter's and catcher's helmets, baseballs and softballs, ice hockey helmets, soccer shin guards, lacrosse helmets and facemasks, and polo helmets. NOCSAE is comprised of a board of directors representing stakeholders from numerous groups – including consumer and end users, equipment manufacturers and reconditioners, athletic trainers, coaches, equipment managers, and academic and sports medicine associations. These diverse interests have joined forces to reduce sports-related injuries. NOCSAE is a nonprofit, charitable organization supported by individuals and organizations with an interest in athletics. For more information, please visit www.nocsae.org.

Exhibit L

This Football Helmet Crumples—and That's Good

Seattle startup Vicis tries to crack a tough market.

By Bryan Gruley and Peter Robison | January 11, 2016
Photograph by Caroline Tompkins/Bloomberg

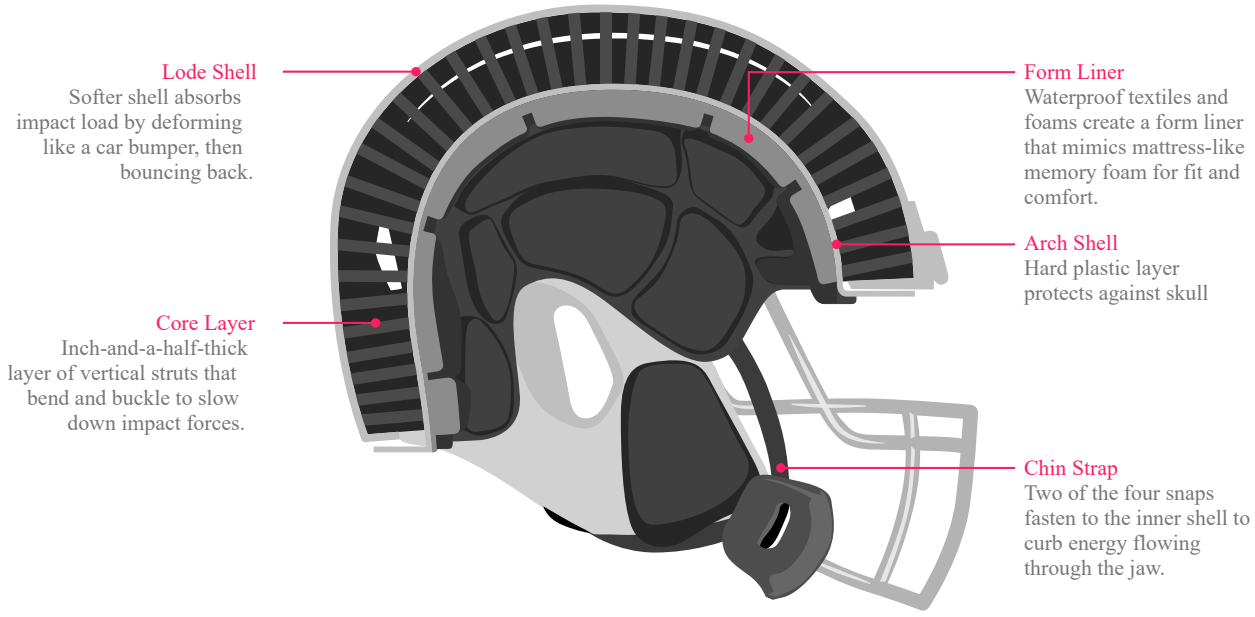
Dave Marver crouches in his Seattle office, brandishing two black football helmets that look pretty much alike. One is made by Riddell, the nation's best-selling helmet manufacturer. The other is a prototype made by Vicis, the startup company for which Marver is chief executive.

He slams the crown of the Riddell model onto the concrete floor, producing the familiar violent crack of a strong safety blindsiding a wide receiver. Then Marver bangs his own company's helmet down. The sound it makes is a flat, squishy thump—not something likely to thrill the average National Football League fan. Marver grins. "It's up to us," he says, "to make thump cool."

To treat football's concussion plague, Vicis (http://vicis.co/) (VYE-sis) has

Additional layers further dampen impacts and cradle the player's head in mattress-like memory foam. Two of the four chin-strap snaps fasten to the inner shell rather than the outer one, which Vicis's engineers think will curb energy flowing through the jaw.

The Helmet Reimagined



Source: Vicis

At the same time, Marver knows the essential form can't seem too different. The first thing many players do with a new helmet is try it on in front of a mirror. "They're young males, they're invincible, they want it to look cool," he says.

With the Will Smith movie *Concussion* in theaters and 25 percent of parents in a Harris Poll last year saying they won't let their kids play football and other contact sports, a cottage industry of scientists and entrepreneurs is trying to invent safer gear. The NFL is supporting some efforts (https://ninesights.ninesigma.com/web/head-health/awardees) with $60 million in grants in a joint program with General Electric and Under Armour. The recipients include a company making a turf underlayer that cushions falls and UCLA researchers working on a new type of helmet liner.

around the potential for their product," says Jeff Miller, the NFL's senior vice president of health and safety. "The idea is that it's disruptive technology. How much it revolutionizes the industry, we'll see."

Even with the growing body of evidence about concussions at all levels of the game, the helmet market isn't easy to crack. For years, Riddell and No. 2 Schutt Sports (http://www.schuttsports.com/default.aspx) have claimed about 90 percent of the $100 million to $150 million business. A newer company, Detroit's Xenith (http://www.xenith.com/), sells helmets with an inner bonnet that, somewhat like Vicis's technology, seeks to absorb energy and reduce sudden movements of the head. The company's market share of about 10 percent is concentrated among high school and youth players. Rawlings reentered the business five years ago only to exit again last summer after being sued by Riddell for patent infringement. (Rawlings said at the time that its exit was unrelated to the lawsuit).

Vicis won't be competing on price, charging four to five times as much as its rivals. The company is also bracing for patent lawsuits from Riddell. "That's how they compete," Marver says, alluding to the Rawlings case and past litigation that drove Schutt into bankruptcy. "It's one reason you don't see as much innovation in this space as you'd like."

A Riddell spokeswoman says the company is "disappointed" at Marver's remarks. "If the CEO expects litigation—before the new helmet has even been publicly introduced—we cannot help question how Vicis defines innovation," she says. Should Riddell determine the Zero1 infringes patents, "we will protect our innovation." Schutt CEO Robert Erb says: "We're always interested in new technology and innovation. It's difficult to say that anything we haven't seen is actually new and innovative."

Vicis helmet design studio.

Source: Vicis

Marver and his staff of about 25 work in a low-slung building of cinderblock walls across the street from the Bill and Melinda Gates Foundation. Designers sitting at desktop computers amid racks of competitors' helmets wear Vicis prototypes to get an idea of what customers will see and feel. An empty room is being readied for an assembly line scheduled to start churning out the Zero1 this spring.

Marver, 47, played football growing up in Cincinnati but gave it up for golf because he thought he was too small. A fan of both his hometown Bengals and Seattle's Seahawks, he once sold pacemakers and other devices for Medtronic and more recently was CEO of a maker of defibrillators. "I grew up in medical tech, which is why the issue with helmets doesn't scare me," he says. "We are a medical technology company addressing a public health problem."

seen are many in their early teens who have already suffered multiple concussions and need to quit playing their sport. “It was striking to me how emotional that conversation [is] for the kid and his parents,” Browd says. Some of his patients have college scholarships on the line. “It’s not uncommon for me to make moms cry,” Browd says, “so it was particularly touching to see dads cry, too.”

Two-and-a-half years ago, Browd, who also teaches at the University of Washington, reached out to Per Reinhall, a lanky Swede who prefers hockey to football and chairs UW’s mechanical engineering department. Reinhall at the time was working separately on technology to dull the vibrational din of pile drivers used in bridge and dock construction, which can hurt aquatic life.

Over coffee, Browd and Reinhall made sketches and swapped helmet ideas, like fashioning an outer shell of tectonic plates that would disperse the energy of hits by shifting on impact. Eventually, they recruited Marver, with his sales experience, to their effort. “I didn’t want this to be a science project,” Browd says. “You have to commercialize it to make it real to people.”

The trio formed Vicis, a Latin word meaning change. “It’s also a sharp, fierce-sounding name that implies speed,” Marver says. Browd’s tectonic-plate concept morphed into an “inside-out” helmet with a softer outer shell. The idea echoes the thinking of auto engineers who determined long ago that crushable materials and structures are better at protecting car occupants because they absorb energy as they collapse.

By slowing the impact—even by mere milliseconds—the crumpling eases the acceleration factor in Newton’s Second Law of Motion (force = mass x acceleration). Riddell’s popular SpeedFlex helmet

Marver, Reinhall, and Browd appeared before the W Fund, an early-stage venture vehicle affiliated with UW. Reinhall displayed a palm-size square of pink material. Slender vertical struts were sandwiched between thin plastic wafers. The fund invested $1 million, and Reinhall's pink prop became a black, 1.5-inch-thick layer of hundreds of tightly spaced struts fitted within the contours of the Zero1's inner and outer cores.

Like miniature shock absorbers, the struts buckle and flex on impact, sucking up energy before it reaches a player's brain. The design was inspired by principles articulated by Swiss physicist Leonhard Euler in the 1700s that are now a foundation of structural engineering.

Close-up of inner layer with buckling struts.

Source: Vicis

"It was tricky because players don't want to play with a marshmallow on their heads," Marver says. "That's why we were stoked to find an outer shell material that felt traditional—hard, shiny, paintable—but deformed locally upon impact." All he'll say about the material is that it's a polymer plastic used in the auto industry. You can make a shallow dent in it with a thumb; it bounces back when you release.

Using finite element modeling, a method of digitally simulating a product's real-world performance, Vicis engineers kept varying the number, position, and spacing of the buckling struts. They fitted multiple versions inside prototype helmets and tested them against Riddell and Schutt models in a UW lab. They dropped helmets from varying heights onto a hard rubber pad, mimicking the method used to certify NFL helmets, and slammed them from various angles with a weighted pendulum. A 3D print shop on the floor below finally complained about the constant thudding.

Early Zero1 versions have consistently performed 20 percent to 50 percent better than Riddell and Schutt models, Marver says, especially in simulations of the glancing rotational blows that researchers think may play a larger role in concussions. Tests on the most recent prototypes have yet to be verified by an independent lab.

Vicis also hopes to reduce head trauma by offering a better fit. Traditional

That leaves Vicis aiming at a small piece of a market that isn't big to start with. Former Xenith CEO Chuck Huggins guesses high-end customers might buy 50,000 helmets a year. "I just don't know how you're gonna run a company on that size of market," he says. Huggins's successor at Xenith, Joe Esposito, says inertia may pose the biggest challenge: "It's the same guys selling the same helmets to the same people over the last 20 years."

In Riddell and Schutt, Vicis will battle against companies with vast sales and dealer networks. Seattle entrepreneur Gary Rubens passed on investing in Vicis even though he says he admires Marver and his mission. "It's tough to go into a market where you've got these huge companies that sort of control it," Rubens says.

Vicis helmet form liner components.

Source: Vicis

Few people outside Vicis have seen the Zero1. The company plans to show it publicly for the first time this week at a coaches conference in San Antonio. Independent sources such as Virginia Tech will soon be testing and rating it (http://www.bloomberg.com/news/features/2015-01-28/the-controversial-safety-ratings-that-sell-football-helmets). Dana Marquez, assistant athletic director of equipment operations at Auburn University, says he likes what he's heard about Vicis's internal tests, but wants to see how the helmet performs on the field. Human heads may behave differently than the crash-dummy heads used in the lab, particularly at different temperatures and impact angles, he says.

If Vicis can persuade enough people like Marquez that its helmets are safer than others, the company could expand its technology to lacrosse, hockey, and soccer—a market that could approach $300 million by 2020, according to a

Vicis's initial sales targets will be the 32 NFL teams and 30 to 40 top colleges. Eventually it hopes to develop lower-priced models for high school and youth ball. The company plans to ship 1,500 helmets this year, ratcheting that up to 15,000 by 2018. "Year one is not about making money," Marver says. "It's about making the helmet as good as we can."

Editor: Nick Summers
Graphic: Christopher Cannon
Digital Producer: Emily Engelman

How the Sacklers Shifted $10.8 Billion of Their Opioid Fortune

(https://www.bloomberg.com/graphics/2020-sackler-family-money/)

Aug. 26, 2020

Millions of Beetles Are Wiping Out Forests All Across the World

(https://www.bloomberg.com/news/features/2020-08-17/mountain-pine-beetle-infestations-are-killing-forests-could-worsen-emissions)

Aug. 17, 2020

Video Game Boom Is Also Magnifying Industry's Ongoing Problems

(https://www.bloomberg.com/news/features/2020-08-27/the-video-game-industry-is-booming-but-sexism-and-fairness-need-to-be-addressed)

Aug. 27, 2020

A Visual Guide to the Bes Commuter Bikes

(https://www.bloomber commuter-bikes-guide

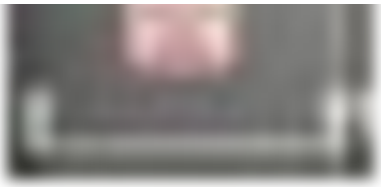
Aug. 14, 2020

If Maricopa County Sours on Trump, So Will Suburbs Everywhere

(https://www.bloomberg.com/news/features/2020-09-03/u-s-election-have-the-republicans-lost-the-suburbs-arizona-county-suggests-so)
Sept. 3, 2020

Choose Your Own Election Adventure: What's the Worst That Could Happen?

(https://www.bloomberg.com/features/2020-election-worst-case-scenario/)
Sept. 3, 2020



Covid Gag Rules at U.S. Companies Are Putting Everyone at Risk

(https://www.bloomberg.com/news/features/2020-08-27/covid-pandemic-u-s-businesses-issue-gag-rules-to-stop-workers-from-talking)
Aug. 27, 2020

Wuhan Beat the Virus. No Moving on by Shutting Ou World.

(https://www.bloomber wuhan-after-coronavir

Aug. 25, 2020

Vicis hired the Seattle design firm Artefact (https://www.artefactgroup.com/) to help with the Zero1's look. "We had the challenge of introducing new technology into a very old, established, and somewhat conservative market," Executive Director Fernd van Engelen says. They drew heavily on automotive tropes. "A football helmet is built like a sports car," proclaims the headline atop a slide in Artefact's design presentation to Vicis. Like a car body, the outer shell should connote "speed and stance" with "clean lines."

From the outside, the Zero1 shown to *Bloomberg Businessweek* doesn't look dramatically different from some Riddell and Schutt models. It bears some resemblance to Riddell's SpeedFlex, from its sleek contours to the stylized vents and ear holes angling toward the helmet's rear. Marver says Vicis's helmet will be comparable in weight and dimensions to current models.

It won't be close on price. While most adult helmets retail for $200 to $400, the Zero1 will sell for $1,500. That may not be a problem for NFL and top college teams, but Marver concedes it's out of reach for budget-constrained

DESIGN

This Startup's 2 Helmets Are Officially the Safest in Football, According to the NFL

Vicis's unique, soft 2018 helmet came in first in a new safety test. The second place finisher? Vicis's 2017 helmet.

BY KEVIN J. RYAN, STAFF WRITER, INC. @WHERESKR

00:00 / 03:01

Seattle-based startup Vicis is on a mission to create a safer football

the Zero1, finished first in the NFL's annual safety test last year.

The NFL just released its results for 2018, and things are looking even better from Vicis's perspective: Its updated 2018 model finished first. The second place finisher? Last year's version. That means the five-year-old startup swept the top two spots on a list made up mostly of helmets from Riddell and Schutt–two legacy companies that as of 2016 owned a combined 90 percent of the U.S. market.

Vicis's helmet is unique in its design: The outer layer is pliable, as opposed to the hard plastic exterior found on traditional helmets. The helmet's second layer consists of a series of vertical columns that can bend on impact. These outer sections act like a vehicle's crumple zone, absorbing some of a collision's impact before its force reaches the player's head. (A Vicis helmet striking another helmet makes a dull *thud* sound, as opposed to the *crack* that fans are used to.) Inside the helmet is a hard layer to protect the skull, and pads on the interior can be sized and rearranged to fit a player's head.

Dave Marver, Vicis co-founder and CEO, says he was "thrilled" to hear the results. "We've been working hard to improve the performance," he says. The company began using a more durable yet lighter material for the helmet's outer layer, which also contributed to its shaving about half a pound off its overall weight. The helmet is now just over four pounds, which shifts it from heavier than average to the low end of the spectrum–an important distinction

COURTESY VICIS

says. "They got all of that done in the span of one off-season."

This season, all 32 NFL teams will have the helmet on hand for players to try

games last season, including the Seahawks' Russell Wilson, the Chiefs' Alex Smith, and the Texans' Jadeveon Clowney. "I would expect our NFL numbers to increase significantly year over year because of positive word of mouth," Marver says.

Wilson, in fact, was impressed enough that he decided to invest in the company this off-season. The company also counts former quarterback Roger Staubach among its investors, while fellow Hall of Famers Jerry Rice and Tim Brown are on the startup's advisory board. Lisa Ertz, mother of Philadelphia Eagles tight end Zach Ertz--who caught the game-winning touchdown in this year's Super Bowl--occasionally acts as a spokeswoman, despite the fact that her son hasn't worn the helmet in any games.

The younger Ertz is indicative of perhaps the biggest hurdle facing Vicis at this point: NFL players are free to choose their own helmet brands and, like a lot of top athletes, are also creatures of habit. Many have worn the same helmet for most of their lives and are thus resistant to switching.

Vicis's approach has been to pursue team equipment managers, who can have influence on their players with those decisions. And while the league doesn't control what helmets its players wear, it does share the results of its annual lab test with all of the teams and encourage them to post the results in their locker rooms.

helmets. (That's actually a drop from its initial price of $1,500 when it launched last year.) The company does offer team discounts for high school squads, though, and Marver says more than 400 teams around the country have placed orders for the upcoming season. "This is why we founded the company, to help kids," Marver says. "We're pleased to finally be at this point." The startup is still working on a smaller helmet designed for youths.

Vicis co-founder and neurosurgeon Sam Browd first decided to attempt to redesign the football helmet in 2012 after years of having to tell young athletes they needed to retire due to too many concussions. He teamed up with mechanical engineer Per Reinhall to create the prototype that eventually became the Zero1.

Vicis will look to close its final funding round in July, which will bring its total raised to between $70 million and $80 million. After that point, Marver expects the company to become cash positive. The company won't share revenue numbers, though the CEO did say he expects the company to sell out of its entire 12,000-unit stock for 2018. At the full $950 price point, that would be a revenue north of $11 million.

The helmet is also making its way through the college ranks: Marver says about 80 NCAA programs will be using it this year, including the majority of the Notre Dame team. Eventually, the company intends to design headgear for other sports as well as the U.S. military.

APR 16, 2018

NEWSLETTER

Inc.

Today's 5 Must Reads

These are the Inc. posts you can't miss before the day is done

Exhibit M

Karen Morris

From: Mike Oliver <mpo@orlawyers.net>
Sent: Tuesday, September 17, 2013 4:45 PM
To: Megan M. Graff
Subject: RE: Shockstrip

Megan,

Your summary is accurate, with the following qualifiers:

For certifying an entire model population:

- Certification is by new helmet model, size, and year. To certify the helmet model as meeting NOCSAE standards, an add-on product would have to be tested on a statistically significant number of new helmets by size. What that sample size number is would be determined by the QA and QC protocols utilized by the company actually doing the certification testing. For a typical new helmet model certified by the manufacturer, that number would be around 220 helmets, with each helmet being impacted 27 times on multiple locations and under different temperature conditions. As production processes change year to year, a new set of certification testing would need to be done for each new model year. The sample size could be smaller for succeeding years, but that would depend on the presence of data showing that the manufacturing process was in control and that the raw materials and source component suppliers were unchanged. This is the type of information only available to the manufacturer of the helmet, and would likely not be available to an aftermarket product manufacturer.
- The certification of compliance with the NCOSAE standard would be made by the aftermarket manufacturer for the entire helmet, not just the add-on equipment, and the responsibility for the performance of the helmet would fall upon the aftermarket manufacturer. The original new certification would be voided and replaced by the aftermarket company certification.
- If the helmets are intended to be subject to recertification, several issues would arise, including whether the recertification standard would permit the removal and replacement of the add-on product, and how the reconditioner would be able to insure that the replacement add-on is the same as the one removed.
- Any design changes in the add-on product would require a separate set of certification data, and the designation of the helmets with the new version would have to have a different model name.
- The certification can only be made on the testing of a new helmet, so the process would likely not be available to grandfather in the certification for adding the product to helmets that are already in use.
- If the helmet is eventually used without the add-on product installed, the aftermarket certification would be voidable, since that would constitute a significant change to the helmet from its condition when certified by the aftermarket company.

For specific helmet certification, an option exists to have a specific helmet or helmets taken to a properly accredited testing laboratory and tested to the NOCSAE standard, such that a specific helmet can be certified by the laboratory as meeting the NOCSAE standard. This is not a new or separate certification, but instead is proof that the helmet tested meets the standard with the add-on product attached. The potential limitation to this option is that a laboratory is not required to make that certification, so the availability of this option rests with the laboratory. The potential upside to this option is that it could be applied to a used helmet and not limited only to new helmets.

Michael Oliver
Oliver & Reichel PA
11020 King Street Suite 215
Overland Park, Kansas 66210

Phone 913-498-8814
Fax: 913-498-8817

From: Megan M. Graff [mailto:MGraff@HHMLAW.com]
Sent: Tuesday, September 17, 2013 2:55 PM
To: mike.oliver@NOCSAE.org
Cc: Shockstrip (shockstrip@zoominternet.net)
Subject: Shockstrip

Mike:
Thank you for chatting with me today. From our conversation, you discussed two avenues that Shockstrip can take to be certified to NOCSAE standards. The first was to test a statistically significant number of a particular model of helmets to then be able to state that that particular helmet model with the Shockstrip applied meets the NOCSAE standards. The second route was to test an individual helmet with the Shockstrip applied to the NOCSAE standard, so only that individual helmet would be certified to NOCSAE standards. If my understanding is incorrect, please let me know.

Megan M. Graff, Esq.
Harrington, Hoppe & Mitchell, Ltd.
26 Market Street, Suite 1200
P.O. Box 6077
Youngstown, Ohio 44501-6077
Office: 330-744-1111
Cell: 330-398-0763
Fax: 330-744-2029
Email: mgraff@hhmlaw.com

Exhibit N

Dr. Steven Novicky
Cell: (330)-503-8030
Email: shockstrip@zoominternet.net

Begin forwarded message:

From: Dave Halstead <dave7x57@gmail.com>
Date: November 5, 2019 at 12:07:22 PM EST
To: Shockstrip <shockstrip@zoominternet.net>
Subject: Re: Recertification info
Reply-To: Daveh@soimpact.com

Dr. Novicky,

We are an A2LA accredited, ISO certified test lab and could test your product, However, before you spend your money on that you should know that at this time your product cannot pass a NOCSAE standard.

The standard demands that helmets be tested and certified as offered for sale.

At this point the only way to get your product on the field is to have an arrangement with the helmet manufacturers so your devices can be on and tested by them prior to sale and further that the helmet maker will not declare the helmet certification void with your device attached.

The default position is, unless you have something in writing from the manufacturer whose helmet the device is on, stating it is OK and they have tested it, it is not legal.

Once the referee asks the coach if his team is legally equipped and he declares it is, the school is now completely on the hook, along with you for any misfortune that may occur with this unauthorized device attached to the helmet. Once the school administrator understand that they will remove them, but even then there is risk the helmet maker may void certification unless they can determine your adhesive or other attachment system is not harmful to the helmet shell.

This has been the case for the 30 years or so I have been involved. It has gotten some new focus as a result of lots of add on devices making claims they cannot support, and the requirement that the NOCSAE certification be independently verified by the Safety Equipment Institute.

On Tue, Nov 5, 2019 at 8:57 AM Shockstrip <shockstrip@zoominternet.net> wrote:
Good morning Dave. Thank you for your rapid response and the information.

I apologize. I was under the assumption that all testing facilities also provided recertification.

I am currently looking for a testing facility to determine if my device can meet the NOCSAE standard.

I was wondering if you would be open to me sending you an equal amount of different new helmets that do not have Shockstrip on them with the same number of helmets that do have Shockstrip on them on to be tested?

If you are able to do this, could you please give me a contact number along with the pricing of testing the helmets with and without Shockstrip on them?

Could you also please let me know when the decision date was made that third-party devices such as Shockstrip, would decertify the helmet, thus making it illegal for field use? I was unaware of this until receiving your email.

Thank you very much and I appreciate your time regarding this matter.

Dr. Steven Novicky

Dr. Steven Novicky
Cell: (330)-503-8030
Email: shockstrip@zoominternet.net

On Oct 18, 2019, at 11:32 AM, Dave Halstead <dave7x57@gmail.com> wrote:

Exhibit O

From: **Jeff Martig** martigj@salem.k12.oh.us
Subject: **Fwd: Helmet Device to reduce concussions**
Date: **Nov 21, 2019 at 6:36:05 PM**
To: **Shockstrip** shockstrip@zoominternet.net

---------- Forwarded message ---------
From: **Dave Halstead** <dave7x57@gmail.com>
Date: Thu, Nov 21, 2019 at 5:08 PM
Subject: Re: Helmet Device to reduce concussions
To: Jeff Martig <martigj@salem.k12.oh.us>

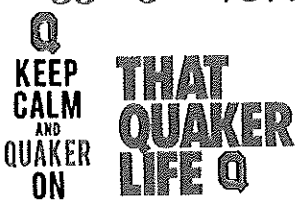
Hi Coach,

We have not tested the devices, but NOCSAE has a position, as does the Safety Equipment Institute on such add on devices. Helmets are certified as compliant with NOCSAE by the Safety Equipment Institute, as offered for sale. Any additions or changes voids the warranty unless you have something in writing from the makers of the helmet stating that it is an authorized add-on. Without that, and it is unlikely you will get that, your helmets would be decertified.

> On Thu, Nov 21, 2019 at 3:22 PM Jeff Martig <martigj@salem.k12.oh.us> wrote:
> Mr. Halsted,
>
> Good afternoon, my name is Jeff Martig. I'm a football coach at Waterloo high school in Ohio. We are currently looking at using a helmet device called Shockstrip next season on our football players' helmets.
>
> We have heard several different opinions on this device and we would like to know what NOCSAE's view on using this type of add-on device.

Thank you for your time.

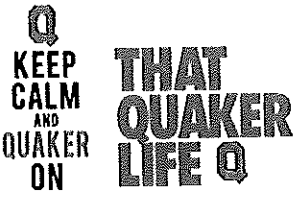
Jeff Martig, MAA, M. Ed
Salem City Schools
Quaker Tech Academy
Transportation Supervisor
W - 330.332.8905
C - 330.501.7379



--

Thank you,

Jeff Martig, MAA, M. Ed
Salem City Schools
Quaker Tech Academy
Transportation Supervisor
W - 330.332.8905
C - 330.501.7379



PLEASE NOTE: This message and any response to it may constitute a public record, and therefore may be available upon request in accordance with Ohio public record law. (ORC 149.43)

Exhibit P

Riddell NEWSROOM

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Updated - Riddell Response to Address Aftermarket Accessories and NOCSAE Certification

August 17, 2018

Football helmets and face masks worn by professional, collegiate, high school and most youth football players are required to meet National Operating Committee on Standards for Athletic Equipment (NOCSAE) performance standards. NOCSAE certification is conducted by Safety Equipment Institute (SEI), an ISO 17065 conformity assessment organization. The certification process involves rigorous internal product testing, independent laboratory testing and a sound quality assurance program. Each helmet and face mask model is certified by SEI to meet NOCSAE performance standards. The certification is void if the helmet or face mask is modified in any way. Riddell recommends against the use of any third party aftermarket accessories that alter the fit, form or function of the helmet or face mask as such modifications void the NOCSAE certification and render the helmet or face mask illegal for most organized play.

- Resources
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- Frequently Requested Information
  - Contact Us
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  - Press Releases
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Media Contacts

Media Hotline
media@riddellsports.com
818-902-5818

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www.brgsports.com www.riddell.com

Exhibit Q

parents: "seeing stars," disorientation, confusion, wooziness, dizziness, loss of balance, loss of memory, headache, neck or spine pain, nausea, vomiting, or any other symptom you believe may be the result of an impact to the head. If you experience any of the above symptoms, discontinue all football activities until you have received written medical clearance and all symptoms have resolved for an extended period of time.

Ignoring this warning may lead to additional and more serious injury, including potentially fatal second impact syndrome. Removal of any warning label on this helmet will void, as to that helmet, the helmet warranty and any indemnification or contribution right that may exist.

XENITH FOOTBALL HELMET WARRANTY

Xenith warrants helmet shells to be free from defects in material and workmanship for a period of (5) years from the date of shipment for all youth and varsity shells including the assembled liner (including the interior liner, all shock absorbers, jaw plates and hook/loop attachments); comfort pads are warranted for one (1) year only.

If during the warranty period, the helmet shell and/or liner fail in the course of normal use due to material defect, customer (not other parties having physical po ment) shall notify Xenith and request a retur aut ctive unit shall then be returned to Xenith's r r

2. Use of helmet replacement parts other than Xenith approved replacement parts.

3. The application of any unapproved device or material to the helmet.

4. Failure to recondition your helmet with Xenith or a NAERA certified member at least once every two (2) years (seasons). Xenith recommends reconditioning every (1) year. You may schedule your reconditioning service at **https://www.xenith.com/pages/schedule-reconditioning**

5. Failure to store the helmet in a climate-controlled environment.

Warranty exclusions: except as noted, the following components are not warranted: chin pieces, low and high chin straps, snap buckles, facemasks, facemask clips, and fastening hardware including but not limited to t-nuts, screws, and snaps. Notwithstanding the foregoing, Xenith warrants the hybrid strap and chin cup assemblies for one (1) year.

Xenith reserves the right to void the warranty if helmets shows signs of damage outside of normal wear and tear.

Begin My Warranty Request

SHOP

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- Apparel
- Accessories
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OUR STORY

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HELP

XENITH

HELMETS SHOULDER PADS NON-TACKLE

XENITH

HELMETS SHOULDER PADS NON-TACKLE

APPAREL ACCESSORIES TEAM SALES LABOR DAY SALE

APPAREL ACCESSORIES TEAM SALES LABOR DAY SALE

Exhibit R

Email Address*

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FAQS

ORDER INFO

- HOW LONG WILL IT TAKE FOR MY ORDER TO ARRIVE?
- WHAT DOES NEXT DAY SHIPPING MEAN?
- DO YOU OFFER EXPEDITED SHIPPING?
- WHERE'S MY ORDER?
- CAN I USE MY TAX EXEMPT STATUS ONLINE?

WARRANTY INFORMATION/RETURNS

- WHAT IS YOUR HELMET WARRANTY?

Football Helmet Warranty For complete details on the helmet warranty, warnings and helmet care be sure to review the football helmet fitting guide that can be found on this website. Important — Warranty -— Performance You may replace or change any part or component of the Schutt Helmet System as long as you follow the manufacturer's guidelines. However, alterations, additions or any component deletions or removals you make to the helmet may void this warranty and could adversely affect the protective capabilities of the helmet. Should there ever be any question regarding the warranty, evaluation or function of a helmet and/or

the component parts, please contact Schutt Sports for a free helmet inspection. Paint Warning Substan applied to the helmet shell which are not compatible with the shell material can cause deterioration, embrittlement and/or breakage, thereby exposing the wearer to unnecessary risk and danger. Usage of non-compatible parts, polishes and/or cleaners will render the helmet shell unsafe for further use and will void warranties. Use only Schutt approved primer, paint, thinner, polishes, and cleaners. For proper helmet painting, contact a NAERA Licensed Reconditioner or Schutt Service Center. Failure to comply can destroy shell integrity and void warranties. If you have any questions concerning paint application, please call Schutt Sports at 800.426.9784 Helmet Warranty The warranty for poly-carbonate shells is five (5) years. In order to honor the shell warranty (after the first year of use), reconditioning by a NAERA certified reconditioner is required every other year. Use only factory replacement parts to validate the warranty. The warranty for ABS shells is three (3) years. Although reconditioning is not required to validate the warranty period for youth helmets, it is recommended that a regular repair and replacement program be adopted until the helmet is retired. Air liners are warranted for a period of one (1) year. Helmets covered under the warranties should be returned in whole with all internal components intact to the Schutt Sports dealer from whom purchased, along with evidence of the purchase date, for return to the Schutt Sports Manufacturing Company. Schutt will inspect the helmet and will determine the disposition of repair or adjustments, or replacement free of charge. Use of Third Party and After-Market Products on Schutt Products All Schutt helmets and faceguards are manufactured and certified to meet the current NOCSAE performance standards. Alterations, additions or any component deletions or removals made to the helmet or faceguard that do not follow the manufacturer's guidelines may void any applicable warranty to the product and will void the NOCSAE certification of the helmet and faceguard. Schutt Sports recommends against the use of any third party, aftermarket product or accessory that alters the fit, form or function of the helmet or faceguard. Third party, aftermarket products that are used on a Schutt helmet and do not follow manufacturer's guidelines will void the NOCSAE certification and make the helmet or face mask illegal to use in most organized football leagues, games or other activities.

WHAT IS YOUR RETURN POLICY?

CAN I RETURN MY CUSTOM PAINTED HELMET?

HELMET FITTING AND PAINT STYLES

HOW DO I PROPERLY FIT MY HELMET?

WHAT IS THE DIFFERENCE IN PAINT FINISHES?

WHY DON'T THE COLORS OF THE HELMET APPEAR EXACTLY AS THEY DID ON MY SCREEN?

HELMET CARE

HOW DO I CARE FOR MY FOOTBALL HELMET?

WHAT DOES SCHUTT RECOMMEND FOR CLEANING AND SANITIZING HELMETS AND SHOULDER PADS?

WHAT'S THE BEST WAY TO CLEAN AND SANITIZE SHOUDLER PADS DURING THE SEASON?

WHAT'S THE BEST WAY TO CLEAN AND SANITIZE A FOOTBALL HELMET DURING THE SEASON?

Exhibit S

MAYFIELD ATHLETICS

Justin Summerville <jsummerville@mayfieldathletics.com>

Samples for Testing

Vince Long <vlong@schutt-sports.com> Thu, Feb 8, 2018 at 2:42 PM
To: Justin Summerville <jsummerville@hobartmayfield.com>

Hello Justin,

Before we agree to do more testing at our expense we need to get some hard numbers on cost of the clips. As an FYI, our current loop straps are molded in a 48 cavity hot runner mold in Asia. Needless to say these are very cost effective. Up to this point we have tested your product at no benefit to us and no cost to you and relayed the info. As you are aware testing is not quick and if you have to go to a certified lab, it is not cheap. As you mentioned in your email below, your original clip did result in facial contact of the guard to the chin which as you know is considered a failure. In speaking with an engineer from another football helmet manufacturer he reported that they saw the same thing and this was with product that they had just recently bought off of your internet site. Currently your website states that the S.A.F.E. clip works with several of our models. Have you tested all these models to confirm that there is not an issue?

Regards,

Vincent Long

DIRECTOR, R&D

KRANOS CORP dba SCHUTT SPORTS

610 S. INDUSTRIAL DRIVE, LITCHFIELD IL 62056

W: 217.324.2712 x2428

F: 217.324.3236

C: 217.851.2817

WWW.SCHUTTSPORTS.COM

From: Justin Summerville [mailto:jsummerville@hobartmayfield.com]
Sent: Wednesday, February 7, 2018 1:14 PM
To: Vince Long
Subject: Samples for Testing

Hi Vincent,

I wanted to touch base and get you some samples of our improved clip for testing. As I'd mentioned when we spoke in Charlotte, we've made some modifications to the clips to take care of the chin contact issue. Let me know if you have a different address for me to send the samples to our if you want me to use the same one as previously. Thanks and have a great day.

Best,

Justin

--

Justin H. Summerville

President & CEO

586-256-1597

[Quoted text hidden]